DEPARTMENT OF THE ARMY
ALASKA DISTRICT, U.S. ARMY CORPS OF ENGINEERS
REGULATORY DIVISION
P.O. BOX 6898
JBER, AK 99506-0898

Regulatory Division
POA-1995-120

Re: Release of the Donlin Gold Project Draft Environmental Impact Statement

Dear Reader:

Enclosed is the Donlin Gold Project Draft Environmental Impact Statement (Draft EIS). This document has been developed in accordance with the National Environmental Policy Act of 1969. The U.S. Army Corps of Engineers (Corps) prepared this Draft EIS to analyze the impacts of issuing permits for an open pit, hardrock gold mine 10 miles north of the village of Crooked Creek on the Kuskokwim River in southwest Alaska. In addition to the proposed mine, the project would:

- Construct a 315 mile natural gas pipeline from Cook Inlet through the Alaska Range to the mine site;
- Construct a new port at Angyaruaq (Jungjuk) on the Kuskokwim River and a 30 mile access road to the proposed mine site;
- Require expansion of the Bethel Yard Dock and fuel terminals in Dutch Harbor; and
- Supply equipment, cargo and diesel fuel using barges operated on the Kuskokwim River.

The Corps is the lead federal agency for this EIS. The Bureau of Land Management; U.S. Fish and Wildlife Service, Pipeline and Hazardous Materials Safety Administration; U.S. Environmental Protection Agency; the Alaska Department of Natural Resources; the Aniak/Kuskokwim River Watershed Council; and the federally recognized Tribal governments of Crooked Creek, Chuathbaluk, Knik and Napaimute serve as cooperating agencies in developing the EIS.

The Draft EIS documents the impact analysis of Donlin Gold's Proposed Action and alternatives. The public was provided a scoping period at the beginning of the EIS process to identify potential issues and concerns associated with the Proposed Action. The EIS scoping period began December 14, 2012 and ended March 29, 2013. Scoping comments were then used to help develop alternatives to the Proposed Action, to guide the analysis of potential effects, and to identify potential mitigations for inclusion in the Draft EIS.

The Draft EIS is intended to fully disclose known or anticipated impacts and to offer the public, tribes, and governmental agencies a chance to comment on draft conclusions. The Final EIS, estimated to be released in mid-2017, will provide agency decision-makers with the scientific basis for their permitting decisions.

On November 30, 2015, a Notice of Availability (NOA) for the Draft EIS was published in the Federal Register. Comments will be accepted following the publication of the NOA in the Federal Register. The public comment period will run from November 30, 2015 through April 30, 2016. Relevant comments, as defined by NEPA, and information submitted will be summarized and addressed in the Final EIS. Relevant comments are comments that, with reasonable basis, question the accuracy of the information in the Draft EIS, the adequacy of, methodology for, or assumptions used for the environmental analysis; present new information relevant to the analysis; present reasonable alternatives other than those analyzed; and cause changes or revision in one or more of the alternatives. The Corps can best use your comments if received within the review period.

Written comments and statements must be postmarked no later than April 30, 2016. Faxed or emailed comments must be submitted no later than midnight April 30, 2016.

Where and how to access the document

You may access the document on the internet at www.DonlinGoldEIS.com and requests for a CD of the Draft EIS can be made to Keith Gordon, Project Manager, U.S. Army Corps of Engineers, Alaska District, CEPOA-RD-Gordon, P.O. Box 6898, JBER, AK, 99506-0898.

A printed version of the document may also be viewed at the following public libraries:

- Aniak School Library – Aniak, AK
- Kuskokwim Consortium Library – Bethel, AK
- McGrath Community School Library – McGrath, AK
- Noel Wien Library- Fairbanks, AK
- Z.J. Loussac Public Library – Anchorage, AK
- Alaska Resources Library and Information Services (ARLIS) – Anchorage, AK
- University of Alaska, Anchorage Consortium Library – Anchorage, AK

How to Submit Comments

There are several ways to submit written comments:

- Submit comments at a public meeting
- Email to POA.donlingoldeis@usace.army.mil
- Fax comments to 907-753-5567
- Mail comments to:

Keith Gordon, Project Manager
U.S. Army Corps of Engineers, Alaska District
CEPOA-RD-Gordon, P.O. Box 6898
JBER, AK, 99506-0898.

Comments sent via email, including all attachments, must not exceed a 25-megabyte file size per email. Please include in your comments your name, address, and affiliation (if any). We welcome any background documents to support your comments as appropriate.

Before including your address, telephone number, email address, or other personal identifying information with your comments, please be advised that your entire comment, including your personal identifying information, may be made publicly available at any time. Although you may ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. All submissions from organizations and businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be available for public inspection in their entirety.

Public meetings are not yet scheduled, but are expected to occur from mid-January through April. Meeting dates and other details will be announced at www.DonlinGoldEIS.com and in local media as they are known. The format for these meetings will consist of a short open house to view a summary of the Draft EIS, followed by an opportunity for the public to ask questions and provide comments. Agency representatives and EIS Team scientists will be available to discuss the project and answer questions. The public meetings will be documented by a court reporter. Translators will be present at appropriate locations.

FOR FURTHER INFORMATION CONTACT: Keith Gordon, Project Manager, U.S. Army Corps of Engineers, Alaska District, CEPOA-RD-Gordon, P.O. Box 6898, JBER, AK, 99506-0898; via email at POA.donlingoldeis@usace.army.mil or; at 907-753-5710.

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EXECUTIVE SUMMARY

INTRODUCTION

Donlin Gold, LLC (Donlin Gold) proposes to produce gold from ore reserves owned by the Calista Corporation (Calista), under surface lands owned by The Kuskokwim Corporation (TKC), in remote western Alaska (Figure ES - 1). The proposed Donlin Gold Project (project) would build mining and milling facilities at the mine site, transportation facilities, and a buried natural gas pipeline from Cook Inlet to the mine site to power electrical generation.

CHAPTER 1: PURPOSE AND NEED

1.1 Lead and Cooperating Agencies and Authorities

In July 2012, Donlin Gold submitted an application to the U.S. Army Corps of Engineers (Corps) for permits under Section 10 of the Rivers and Harbors Act of 1899 (RHA) and Section 404 of the Clean Water Act (CWA). The Corps is the lead federal agency and issued a Notice of Intent to prepare an Environmental Impact Statement (EIS) to comply with the requirements of the National Environmental Policy Act (NEPA).

For the proposed natural gas pipeline component crossing federal lands, Donlin Gold filed a Right-of-Way (ROW) lease application with the Bureau of Land Management (BLM) consistent with the requirements of Section 28 of the Mineral Leasing Act of 1920 (MLA) as amended. Donlin Gold also intends to file an application with the Pipeline and Hazardous Materials Administration (PHMSA) for a Special Permit to allow use of strain-based design for all or part of the pipeline instead of building the pipeline to existing federal code.

Five federal and state agencies and six Tribal governments are acting as cooperating agencies with the Corps in developing the Donlin Gold Project EIS (Table ES - 1). For the BLM and PHMSA, this avoids the need for a separate EIS to support their permitting decisions. Cooperating agencies have jurisdiction over some part of the project by law or have special expertise in potential environmental effects to be addressed in the EIS. Cooperating Tribes also bring traditional ecological knowledge (TEK) regarding the lands and resources.

Table ES - 1: Cooperating Agencies

Federal/State Agencies	Tribal Governments
· Bureau of Land Management (BLM) · U.S. Fish and Wildlife Service (FWS) · Pipeline and Hazardous Materials Safety Administration (PHMSA) · U.S. Environmental Protection Agency (EPA) · State of Alaska	· Village of Crooked Creek · Native Village of Napaimute · Native Village of Chuathbaluk assisted by Center for Science and Public Participation · Akiak Native Community assisted by the Kuskokwim River Watershed Council · Village of Aniak · Knik Tribe

The responsibilities of cooperating agencies include assisting the Corps in identifying agency-specific regulatory requirements, issues for analysis in the EIS, and relevant sources of data. The cooperating agencies meet regularly to provide comments on proposed strategies for each EIS milestone and review comments on draft technical documents and the Draft EIS.

The State of Alaska is not required to comply with NEPA when issuing permits, but has a separate process for environmental review and leasing decisions. However, the State has agreed to provide technical expertise to the EIS and to use information from the EIS in its decisions.

1.2 Background

Small-scale placer mining activity has been ongoing at and in the vicinity of the proposed Donlin Gold Project Area (Project Area) since the early 1900s. Placer gold was first discovered at Snow Gulch, a tributary of Donlin Creek, by miners from the Iditarod-Flat District in 1909 during a rush to the George River. Small-scale mining happened in the area from 1910 to 1940. Calista identified mineral potential in the region in 1975 and underwent prospecting and limited exploration activities from 1984 to 1987. The first substantial hardrock gold exploration drilling program was initiated by WestGold in 1988 and 1989. Placer Dome US explored the vicinity from 1995 to 2000 and constructed a 75-person camp, 17 miles of roads, and a 5,000-foot long airstrip to support advanced exploration and other programs. The camp used during the exploration and baseline studies leading to the Donlin Gold permit applications remains in place.

In December 2007, Donlin Creek LLC was formed with 50/50 ownership by Barrick Gold North America and NOVAGOLD Resources Alaska, Inc. In 2011, the company's name was changed to Donlin Gold, LLC (Donlin Gold). Activities at the Donlin Gold Project are managed by Donlin Gold, which oversees all aspects of development with input from both partners. Donlin Gold operates under agreements with two Alaska Native Claims Settlement Act (ANCSA) landowners, Calista (for the mining lease), and TKC (for the surface use agreement).

Project Summary

Reserves: Over 33 million ounces of gold (about 500 M tons ore)

Mine Life: Approximately 27.5 years

Production: Over 1 million ounces gold annually

Operation: Open pit, conventional

Milling and Processing: 59,000 tons/day: sulfide flotation, pressure oxidation (POX) and Carbon-in-Leach (CIL) recovery

Strip Ratio: About 5.5:1 = about 3 billion tons waste rock

Tailings: Fully lined tailings storage facility (TSF)

Power: ~227 MW on-site gas-fired power plant, supplied by a 315-mile, 14-inch, buried natural gas pipeline

Transportation and Logistics: Supply by Kuskokwim River transportation system with expanded port facilities at the Bethel cargo terminal, river barge traffic, barge landing at Angyaruaq (Jungjuk), 30-mile mine access road, 5,000-foot airstrip, and transportation facilities.

1.3 Project Overview

Donlin Gold proposes to develop an open-pit, hardrock gold mine in the Kuskokwim River watershed, 277 miles west of Anchorage, 145 miles northeast of Bethel, and 10 miles north of the community of Crooked Creek (Figure ES - 1). The proposed project would require approximately 3 to 4 years for construction with a projected mine life of approximately

27.5 years. The project would take place in three phases: the construction phase, the operations and maintenance (operations) phase, and the closure, reclamation, and monitoring (closure) phase). The project consists of three key components: mine site, transportation facilities, and pipeline (described below).

At mine life end, facilities would be closed and reclaimed in compliance with permit conditions. Above-ground facilities associated with the pipeline would be decommissioned and removed, while below-ground portions of the pipeline would be purged, plugged, and left underground.

After the scoping period, the Corps compiled comments into a Scoping Report and guided the technical analysis to address these issues in the Draft EIS. Additional public meetings will be held to receive public comments, and these will be incorporated into the Final EIS. As part of its permit review, the Corps will issue a public notice of the permit application and evaluate comments received on the permit notice and on the Final EIS. The Corps will prepare a Record of Decision (ROD) to describe the Corps' evaluation of the permit application and convey whether the permit is granted or denied. The ROD will also include any conditions attached with permit approval.

1.4 Issues Selected for Analysis

The Corps and cooperating agencies selected substantive impact issues identified during public and agency scoping for further analysis and dropped non-substantive issues from evaluation. Selected issues are listed in Table ES - 2 and documented as statements of concern in the Scoping Report (Appendix B of the EIS).

1.5 Purpose and Need

NEPA guidelines for an EIS (40 CFR § 1502) direct that "The [purpose and need] statement shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." This statement is developed through consideration of the purpose and need stated by the applicant (Donlin Gold). To develop the EIS statement, the Corps focused on Donlin Gold's statement, exercising independent judgment in defining purpose and need for the project from both Donlin Gold and the public perspective. The Corps and cooperating agencies are neither proponents nor opponents of the proposed project.

The proposed project's purpose, determined by the Corps and cooperating agencies, is to produce gold from ore reserves from the Donlin deposit using mining processes, infrastructure, logistics, and energy supplies that are economical and feasible for application in remote western Alaska. The need for the project is to provide economic benefits to Donlin Gold, Calista, and TKC shareholders; to produce gold to meet worldwide demand; and to provide local economic development.

The Corps, BLM, and PHMSA will rely on this EIS for ROW and permitting purposes, so their regulatory guidance must also be followed. Specific project purpose and need statements based on individual agency requirements are provided in Chapter 1 of the EIS, Purpose and Need.

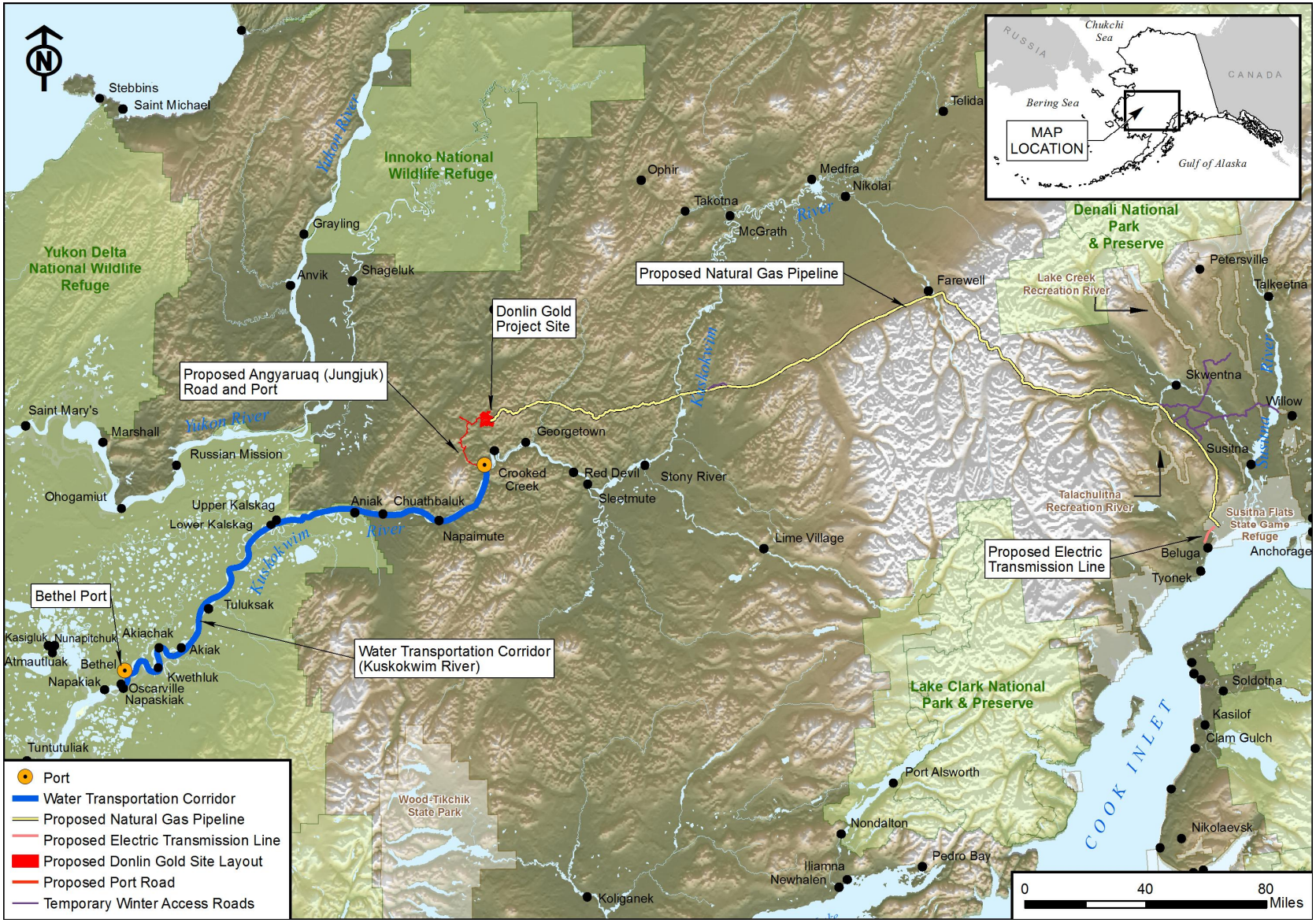

Figure ES - 1: Project Location Map

Table ES - 2: Issues Identified During Scoping Brought Forward For Analysis

Issue Topic or Resource	Concerns or Potential Effects
Air Quality	Effects from dust/particles and suspended heavy metals; contribution to greenhouse gas (GHG) emissions and climate change.
Floodplains	Increased risk of hazardous spills, erosion and sedimentation, and potential effects on water quality, river geomorphology, fish, wildlife, habitat, and subsistence activities and resources.
Geology	Effects of construction and operations including soil, permafrost, topography, and landform alteration, and effects on paleontological resources; surface disturbance resulting in erosion and sedimentation; geological hazard (particularly seismic events) effect on vulnerable project components.
Groundwater	Effects on groundwater systems and aquifers from potential contamination; potential for mine operations to reduce water table and flow in Crooked Creek.
Hazardous Materials and Waste Management	Effects from mercury and cyanide handling and detoxification; mobility, toxicity, and management of naturally occurring arsenic; and risk and response to chemical and fuel spills and accidents.
Hydrology	Effects on streams and local water bodies, and disruption of local water patterns. Barge traffic effects to riverine systems, including wave-induced erosion to shore banks.
Water Quality	Effects from construction, operations, reclamation, and long-term storage of tailings and rock including acid rock drainage, metal leaching, erosion, turbidity, temperature changes, and fuel and chemical spills.
Migratory Birds	Effects on migratory birds, waterfowl, and shorebird population abundance, diversity, and migratory patterns.
Bald and Golden Eagles	Effects of construction and operations on bald and golden eagles and habitat resulting in removal of nests, loss of habitat, and disturbance of birds during construction, operations, and maintenance.
Fish and Aquatic Organisms	Effects on salmon, resident fish, and Essential Fish Habitat (EFH) from barge traffic, water diversion, noise and vibration disturbance, changes in temperature regime and water quality, and displacement in streambeds. Pipeline construction and operation could affect salmon spawning beds and passage.
Marine Mammals	Effects from increased marine barge traffic and the potential for spills.
Terrestrial Wildlife	Effects of construction and operations causing disturbance, potential loss of habitat, permanent and long-term alteration of habitat, and obstruction of migratory patterns. Effects of disturbance from increased recreational use and changes in hunting and trapping pressure due to changes in access.
Threatened and Endangered Species	Effects from increased barge traffic on eiders or marine mammals listed under the Endangered Species Act (ESA).
Vegetation	Potential for fragmentation of wetlands, changes in surface and groundwater hydrology, increased disturbance from human activities, and introduction of invasive species.
Wetlands and Aquatic Communities	Effects of construction of the proposed mine and pipeline that would require filling of wetlands and the placement of fill, culverts, and associated structures in streams.
Archeological/Cultural Resources	Effects on cultural resources and historic properties, particularly during the construction phase.
Environmental Justice	All federal agencies must identify and address disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities.
Iditarod National Historic Trail (INHT)	Effects from construction and operation of the pipeline affecting the physical trail, uses of the trail, the viewshed along the trail, the recreational experience of individuals, and commercial recreational activity in the trail vicinity.

Table ES - 2: Issues Identified During Scoping Brought Forward For Analysis

Issue Topic or Resource	Concerns or Potential Effects
Land Ownership, Management, and Use	Effects from an increase in legal and non-legal access; use incompatibility with land management objectives; effects on scenic, wildlife, visual characteristics, opportunities for solitude and primitive recreation, and existing trail usage.
Recreation	Effects to recreation, tourism, recreational hunting and recreation usage near the mine, along river systems, and in the pipeline corridor during construction and operation.
Socioeconomics	Effects on socioeconomic environment on a local and regional scale, including demographics (population trends with in-migration and out-migration), employment (direct and indirect), household income, housing, and public infrastructure.
Subsistence and Traditional Way of Life	Effects of habitat loss or disturbance and disruption of movement patterns of certain fish, terrestrial mammals, and birds; disruption of access to subsistence hunting and fishing during construction; increased competition for subsistence resources through improved access.
Transportation	Construction and operations effects to regional and local transportation systems including airports, roads, and rivers (barge traffic).
Visual Resources	Effects of vegetation clearing, development of the mine site, river crossings, and overall increased activity in areas considered visually sensitive; decreases in the quality of visual landscape during all Project phases.
Wilderness Characteristics	Effects on wilderness characteristics.

CHAPTER 2: ALTERNATIVES

Alternative development, including a No Action Alternative, is required under NEPA. For this project, alternatives were developed to evaluate different engineering designs, siting choices, technologies, and operational procedures that would reduce impacts to some or many resources, while meeting the proposed project purpose and need. Over 300 options for the project components were identified based on scoping comments, early design options evaluated by Donlin Gold, and options proposed by the Corps and the cooperating agencies.

These options were screened on the basis of NEPA requirements, the Corps Public Interest Review (33 CFR 320.4(a)), and the requirements of the CWA 404(b)(1) guidelines.

The results of this stepwise approach should provide the basis for the Corps to determine the Least Environmentally Damaging Practicable Alternative (LEDPA) later in the permitting process. The following alternatives are evaluated in this EIS:

- Alternative 1 – No Action
- Alternative 2 – Donlin Gold's Proposed Action
- Alternative 3A – Reduced Diesel Barging: Liquefied Natural Gas Facility Powered Haul Trucks
- Alternative 3B – Reduced Diesel Barging: Diesel Pipeline
- Alternative 4 – Birch Tree Crossing (BTC) Port
- Alternative 5A – Dry Stack Tailings
- Alternative 6A – Modified Natural Gas Pipeline Alignment: Dalzell Gorge Route

Alternatives Development Process

Step 1: *Identify Scoping Issues and Related Project Components*

Step 2: *Develop Screening Criteria*

Step 3: *Identify Options to Address Concerns for Each Component & Subcomponent*

Step 4: *Apply Screening Criteria to All Options; Develop Options to Carry Forward and Carefully Document Option Disposition*

Step 5: *Package Options into Action Alternatives*

2.1 Alternative 1 – No Action

The No Action Alternative means that no permits would be issued, and the proposed project would not be implemented.

There would be no mine site development, no transportation facilities, and no natural gas pipeline. The future of the existing camp, airstrip, and related facilities would be decided at the discretion of the land owners: TKC and Calista. The No Action Alternative represents a baseline for comparison of effects between the Proposed Action (Alternative 2) and the other action alternatives.

2.2 Alternative 2 – Donlin Gold's Proposed Action

Donlin Gold's Proposed Action would establish an open-pit, hardrock gold mine in Southwest Alaska, 10 miles north of the village of Crooked Creek (see Figure ES - 1), on land owned by Calista and TKC. The proposed mine would include the pit, processing facility, Waste Rock Facility (WRF), Tailings Storage Facility (TSF), and power plant. Transportation facilities would include a thirdparty to transport fuel and other supplies to the project site from Dutch Harbor, improvements to the Bethel cargo terminal (constructed and operated by a third-party), a dedicated new fleet of river barges and tugs, the Angyaruaq (Jungjuk)

Port, a 30-mile access road, and a 5,000-foot dedicated airstrip.

The proposed project would require 3 to 4 years to construct, followed by an active mine life of approximately 27.5 years. The mine would operate year-round using conventional truck-and-shovel mining methods employing both bulk and selective mining techniques. The mining operations would blast and remove an average of 422,000 tons per day. Total waste rock material is estimated at 3 billion tons, with approximately 2.5 billion tons to be placed in the WRF. Later in the mine life, a portion of waste rock would be backfilled in the mine pit.

Gold-bearing ore would be transported to the mill and processing plant at an average production rate of 59,000 tons per day. Milling components include a gyratory crusher, a semi-autonomous grinding (SAG) mill, and ball mills. Ore processing techniques would include flotation, pressure oxidation (POX), and carbon-in-leach (CIL) process circuits. Conventional carbon stripping and electrolytic gold recovery would produce gold doré bars to be shipped to a custom refinery for further processing. Mercury abatement controls would be installed at each of the major thermal sources. Tailings storage would encompass an area of 2,351 acres with a total capacity of approximately 335,000 acre-feet of mill tailings (the materials left over after the process of separating the valuable fraction from the non-valuable fraction of an ore), decant water, and stormwater in a fully-lined facility.

Electric power would be generated on site from a dual-fueled (natural gas as primary with diesel backup) reciprocating engine power plant with a steam turbine that would utilize waste heat recovered from the engines, with a generation capacity of 227 MW. Natural gas would be transported to the mine via a 315-mile, 14-inch diameter buried steel pipeline originating from an existing natural gas pipeline near Beluga, Alaska within a ROW leased from the State of Alaska, BLM, Calista, and Cook Inlet Region, Inc. (CIRI).

General cargo for the proposed mine would be transported to Bethel by marine barge from terminals in Seattle, Washington and Vancouver, British Columbia. Cargo would be transferred to the dock at Bethel, and then loaded onto river barges for transport up the Kuskokwim River to a port constructed at Angyaruaq (Jungjuk) Creek. A 30-mile all-season access road would be constructed from the Angyaruaq (Jungjuk) Port to the mine site. Fuel would be transported to Dutch Harbor by tanker, then to Bethel by marine barge by a third-party. At Bethel, fuel would be transferred to double-hull river barges for transport to Angyaruaq (Jungjuk) Port and then delivered to the mine site fuel storage facility by tanker trucks.

The Donlin Gold Project would include a permanent camp located about two miles west of the mine site, on the west side of Crooked Creek. The camp would be capable of housing 638 workers during operations. Workers would travel to the site by aircraft using the gravel airstrip for rotational shift changeovers.

Closure is planned with the "design for closure," concept in which mine design and operations minimize the time and effort required to close and reclaim each project component. Concurrent reclamation would be applied whenever possible in areas no longer required for active mining during operations.

2.2.1 MINE SITE

The general mine site layout is shown in Figure ES - 2. Equipment staging would begin after permitting. Prior to operations, crews would establish a construction camp for 2,500 temporary workers at the mine site, implement safety and environmental training, install erosion and sediment controls, construct access and haul roads, and clear and grub the area to be mined. Construction of the TSF, WRF, and processing facilities would also occur during the 4 year construction phase.

2.2.1.1 Mining and Processing

Gold-bearing rock within the Donlin deposit is found in two adjacent areas, the ACMA and Lewis deposits (Figure ES - 2).

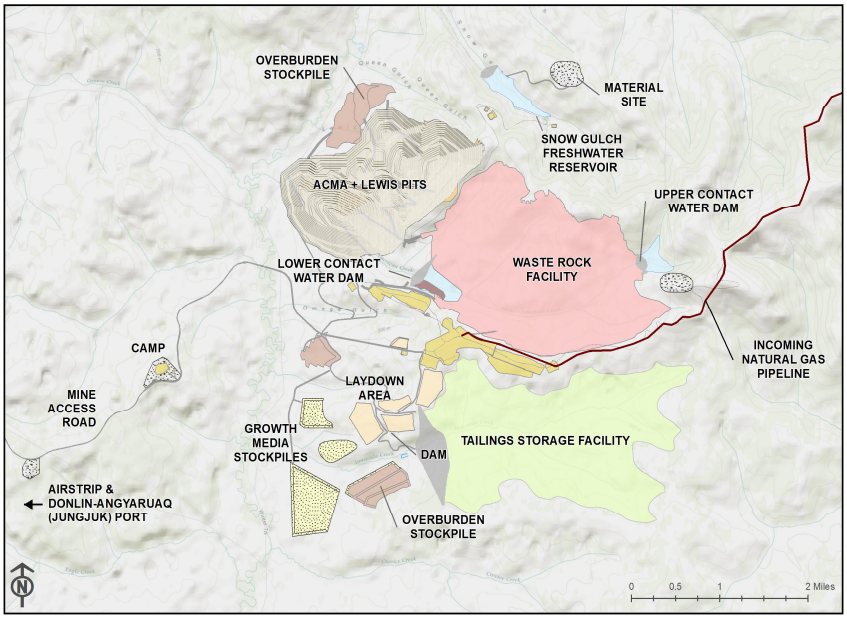

Figure ES - 2: Proposed General Mine Site Layout

The ACMA pit would be approximately 1,850 feet deep from the high wall, and Lewis pit would be approximately 1,653 feet deep from the high wall. The two pits would merge at the surface into one roughly oval, open pit, about 2.2 miles long by 1 mile wide near the end of the operations and maintenance phase (subsequently, the pit).

Initial open-pit mining operations would use hydraulic shovels, wheel loaders, drills, large-capacity haul trucks, and auxiliary equipment, including track dozers, wheel dozers, water trucks, graders, excavators, small wheel loaders, blasting product trucks, service trucks, transport vehicles, cranes, and trailer-mounted light plants.

Daily blasting during construction and operations would fracture and loosen rock prior to excavation. Blasting agents would include emulsion and ammonium nitrate and fuel oil explosives.

Ore would be mechanically broken down into fine particles by crushing and grinding in the processing facilities after transport from the pit. Flotation would then separate the gold-bearing sulfide minerals. Processing procedures would follow sequentially to separate the gold and produce doré bars (terminology described below).

Mercury is a naturally occurring element found within the Donlin deposit as the mineral cinnabar (mercuric sulfide or HgS). Some of the mercury is released when ore containing mercury is processed. During ore processing, volatilized mercury would be separated, recovered, collected and transported in accordance with the mercury management plan. Mercury would be in the forms of liquid elemental mercury and mercury-impregnated carbon. Both forms would be shipped by barges to a permanent, federally-approved, mercury storage facility.

Donlin Gold estimates that mercury collection would remove approximately 34,600 pounds per year of mercury from the gaseous waste streams.

Ore Processing Terminology Definitions

Flotation *– The process of using water and minute amounts of chemicals and agitation to separate gold-bearing sulfide minerals from ore by inducing them to gather in and on the surface of a froth layer within a flotation cell. This process recovers the sulfide minerals containing the gold, which are then skimmed off the top of the flotation cells. Spent ore (tailings) is sent to the TSF.*

Pressure oxidation (POX) *– The process of pre-treating ore using elevated temperatures, pressure, and oxygen to oxidize sulfide materials to expose the valuable minerals encapsulated within the sulfides.*

Autoclave *– The equipment used to oxidize sulfide minerals.*

Cyanidation *- Use of dilute cyanide-containing solutions and oxygen to selectively solubilize (leach) gold or other precious metals from the ore or concentrate, making these metals available for separation.*

Activated carbon *– Carbon manufactured to enhance surface characteristics that attract and promote gold adsorption, removing gold from solution.*

Carbon-in-Leach (CIL) *– The process of leaching gold and other precious metals in agitated tanks in the presence of activated carbon particles. The gold-loaded carbon is then physically separated for further processing to recover the adsorbed gold.*

Stripping *– The separated carbon is treated by changing solution chemistry to remove (strip) the gold from carbon and concentrate the soluble gold in solution.*

Refining *– Plated gold is transferred to a separate area and treated by melting the gold, silver, and any other precious metals. Impurities are removed in this process.*

Doré *– Bars of semi-pure gold, silver, and other precious metals that contain residual quantities of impurities.*

Reagents would be used to concentrate gold-bearing minerals and facilitate the process of separating gold from waste rock. Table ES - 3 lists reagents, estimated annual consumption, and process use in ore refining.

2.2.1.2 Mine Site Water Management

The mine site is expected to operate with an annual water surplus. Most water that comes into contact (i.e., contact water, defined below) with mine infrastructure would be reclaimed for use in ore processing.

Diversion structures would be built to direct stormwater away from facilities to limit storage volumes, erosion potential, and the amount of mine contact water requiring management, including treatment and discharge. Sufficient water storage capacity would cover drought years as well as manage water during wet years. The components of the water management system at the mine site include:

- Pit Dewatering Wells – These wells would be installed around the perimeter of the pit to stabilize walls in accordance with safety

Contact Water Definition

Contact water includes "mine drainage" which is defined by regulation as "any water drained, pumped, or siphoned from a mine," which includes water from horizontal drains that accumulates in the pit. Contact water also includes runoff and seepage from the WRF and other stockpiles. Non-contact water is defined as water that would not come into direct contact with mined materials.

Table ES - 3: Estimated Annual Consumption of Reagents Used at the Processing Facility

Reagent(s)	Estimated Annual Consumption (Tons)	Process Use
Potassium amyl xanthate	4,189	Used during flotation to capture sulfide minerals
Methyl isobutyl carbinol and F-549	1,984	Used during flotation as a frothing agent
Nitric acid	661	Used to wash carbon during refinery process
Sodium cyanide	2,535	Used to dissolve gold in CIL process
Lime (calcium oxide)	21,027	Used to control the pH of oxide minerals for CIL leaching, cyanide detoxification, and to balance the pH of tailings
Activated carbon	220	Used to capture dissolved gold and in mercury abatement
Caustic soda (sodium hydroxide)	358	Used to raise the pH in the strip circuit, for mixing cyanide, and to neutralize spent acid solution used in acid-washing carbon
Mercury suppressant (UNR 829)	44	Used to reduce the soluble mercury levels leached into solution from the autoclave process
Flocculants	3,527	Used to accelerate settling of solids in the thickening of tailings, chloride wash, flotation concentrate, and POX wash
Sulfur	1,414	Used in the cyanide detoxification process
Copper sulfate	2,425	Used during flotation and as a catalyst in cyanide detoxification
Fluxes (borax, sodium nitrate, and silica sand)	165	Used in the preparation of furnace charges for assaying or refining
Water softening and anti-scalant agents	1,064	Added to process water to reduce levels of dissolved calcium, magnesium, manganese, and ferrous iron and to prevent scaling in pipes

Source: Fernandez 2013a.

requirements. Water removed from the pits would be treated and discharged according to Alaska Pollutant Discharge Elimination System (APDES) permit requirements. During operations, roughly one-third of the pit water would be sent to the mill as a source of fresh water, and the rest would be treated and discharged.

- Contact Water Dams (CWDs) – Lower and upper CWDs would be constructed in American Creek to capture contact water runoff and seepage from the WRF and stockpiles and water collected from horizontal drains in the pit. Water stored in the ponds created by these dams would be used for ore processing, or treated and discharged.
- Fresh Water Storage and Diversion – Structures including a temporary diversion dam in upper American Creek and two temporary fresh water diversion dams (FWDDs) in Anaconda Creek would be built to manage non-contact water. The reservoir at Snow Gulch would supply fresh water through the operation period.
- Process Water Requirements – The ore processing plant would require a minimum of about 3,200 gallons per minute (gpm) of fresh water to operate and average about 17,500 gpm over the life of the mine. Reclaimed water from the TSF would be used first (75 percent of total), followed by contact water (15 percent). Pit dewatering water, TSF seepage water, and fresh water from the Snow Gulch reservoir (10 percent combined) would also contribute to meet the water requirements.
- Water Treatment Plant - A water treatment plant (WTP) would be designed for a peak treatment rate of 4,671 gpm and an average rate of 2,946 gpm. The discharge location would be to Crooked Creek below Omega Gulch.
- Other Water Uses – Ore processing would consume nearly 99 percent of the water needs at the mine site. Other uses such as dust control, fire protection, drinking water, truck wash, and sanitary needs comprise a small fraction of the total water requirements.

2.2.1.3 Tailings Storage Facility

The 2,351-acre TSF would be built in the Anaconda Creek valley immediately south of the WRF (Figure ES - 2). The TSF would have the capacity to store 568 million tons of tailings. The final height of the tailings dam would be 464 feet above existing ground surface.

Construction of the tailings dam would include excavation to bedrock. The dam and tailings impoundment area would be lined with a 60-mil (0.06-inch) textured Linear Low Density Polyethylene (LLDPE) liner.

The amount of fresh water entering the TSF during the first three years of operations would be controlled by the two FWDDs in Anaconda Creek. At the end of the third year, the FWDDs would be decommissioned, and the runoff to the TSF would be controlled with staged diversion channels built on both sides of the facility. A seepage recovery system (SRS) would be constructed immediately downstream of the TSF dam. During operations, water from the SRS would be used as process water, treated and discharged, or pumped back into the impoundment.

2.2.1.4 Waste Rock Facility

An estimated 3 billion tons of waste rock would be excavated from the mine pit with 2.5 billion tons placed in the WRF and the remainder backfilled to the completed pit or used to construct the TSF. The 2,240-acre WRF would be immediately east of the pit in the American Creek valley (Figure ES - 2). The WRF would be unlined; drainage control would be provided using engineered rock drains and secondary rock (finger) drains. Runoff would be captured.

Waste rock is classified as either non-acid-generating (NAG) or as potentially acid-generating (PAG). Classification categories and estimated tons are listed in Table ES - 4.

Table ES - 4: Waste Rock Characteristics and Estimated Tons

Waste Rock Classification	Description	Est. kTon	% of Total
Overburden	Non-acid generating	46,432	1.52
NAG 1-4	Non-acid generating	2,776,721	91.10
PAG 5	Potentially acid generating after several decades	87,114	2.86
PAG 6	Potentially acid generating in less than one decade	135,064	4.43
PAG 7	Potentially acid generating in a few years	2,555	0.08
Total		**3,047,886**	**100**

Notes:
kTon = thousand tons Est. = Estimated
Source: SRK 2012e.

During the early operations years, approximately 123 million tons of PAG 6 would be placed in permanent, isolated cells in the WRF to reduce contact with water and minimize the acidification potential. Approximately 2.5 million tons of PAG 7 would be placed on a low-grade ore stockpile area for temporary storage at the toe of the WRF, near the center of American Creek valley. Once the ACMA pit closes at Year 22, the PAG 7 material would be relocated to the bottom of the ACMA pit. All PAG 6 and PAG 7 subsequently mined in the Lewis pit would also be placed in the ACMA pit as backfill, and no additional waste rock would be placed in the low-grade stockpile or isolated cells in the WRF.

Approximately 5 million tons of PAG 5 waste rock would be used for construction of lined containment portions of the TSF. NAG waste rock would be used in unlined areas of TSF construction as fill, filter media, riprap, and underdrain material.

2.2.1.5 Power, Utilities, Services, and Infrastructure

The total planned generating capacity for the mine site and permanent accommodation camp is 227 MW, including redundancy (duplication of critical components or functions of a system to increase reliability of the system). The average running load is designed to be 153 MW (Table ES - 5). Electric grinding mill motors at the ore processing plant would use most of the power generated.

Table ES - 5: Summary of Mine Site Components Power Use

Mine Site Power	Power Use
Total connected load	227 MW
Engines	12 natural gas fueled combined-cycle engines with heat recovery and steam cogeneration
Emergency power	1 generator
Average running load	153 MW
Average natural gas consumption	11.2 billion standard cubic feet (BSCF) per year
Angyaruaq (Jungjuk) Port generators	2 x 600-kW, one primary, one standby
Airstrip generators	2 x 200-kW, one primary, one standby

Source: SRK 2012a.

Electrical generation system components include:

- Power Plant and Transmission Lines - A dual-fueled (natural gas and diesel) multi-engine power plant would generate power for the mine site. The primary power plant fuel source would be natural gas transferred via a 315-mile long pipeline (see Section 2.2.3), but diesel could also be used as a backup fuel. Power would be distributed to the main process areas of the mine by power cables and overhead transmission lines.
- Fuel Storage and Distribution – A lined and bermed fuel storage facility would have a total storage capacity of 37.5 million gallons (Mgal). Mine site fuel storage tanks would be designed to contain a 10-month supply plus one month of contingency for the mine vehicles and equipment fleet.

Services and infrastructure components include:

- Camp Buildings and Facilities – The permanent accommodations camp would be approximately 2.4 miles from the mine site along the mine access road, housing up to 638 workers during operations.
- Solid Waste Management and Disposal - Management of solid waste would be in accordance with the project waste management plan and applicable permit requirements. Solid waste would be reused, recycled, or returned to the vendor as appropriate or permanently disposed of in a designated section of the WRF.
- Waste Water Management and Disposal – Two sewage treatment plants (STPs) would be installed at the mine site: one at the permanent accommodations camp and one at the temporary construction camp. After construction, the construction camp STP would be reconfigured to receive sanitary flows from the process facilities during operation. Treated effluent from both plants would be discharged to the TSF.
- Hazardous Waste Management – The mine site would have no permanent on-site hazardous waste management facility, and all hazardous waste would be shipped off-site for permanent disposal at an approved facility. Mercury and mercury-containing materials would be managed in accordance with the Donlin Gold Mercury Management Plan.

2.2.1.6 Closure, Reclamation, and Monitoring

The overall purpose of reclamation is to stabilize disturbed areas by returning to vegetated conditions, ensuring long-term function of land and water resources. Concurrent reclamation would be performed during operations whenever possible in areas that are no longer being actively mined. After site reclamation in accordance with an approved reclamation plan, monitoring would occur for 30 years or more to ensure successful implementation of the reclamation plan, protecting the environment and human health and safety.

The closure and reclamation components include:

- Pit - Upon final mine closure, the haul roads in and around the pit would be smoothed to eliminate all berms except those necessary for erosion control and public safety. The pit would gradually fill over the

next 50 to 55 years with groundwater recharge, water from surface runoff, and water pumped from the TSF.

- TSF - In the first year of reclamation, during operations, TSF water would be pumped back into the pit. During the next 3 years, one-third of the tailings surface would be progressively reclaimed each year. During the closure and post-closure periods, seepage from the TSF would be monitored for quality.
- WRF - The WRF would be progressively reclaimed during operations by contouring the underlying waste rock to provide natural drainage and placing a cover designed to minimize infiltration and support vegetation growth. Runoff and seepage from the reclaimed WRF would be pumped to the pit.
- Buildings, Equipment, and Piping - Buildings, equipment, and piping at the mine site not needed for reclamation and post-closure monitoring activities would be reused at another mine site, sold or salvaged, or disposed on site in an approved manner. Sites would then be graded for proper drainage, ripped and scarified, revegetated, seeded, or mulched to follow reclamation plans.
- Electrical Power Facilities - The power plant, substations, overhead power lines, and associated facilities would be removed from the site, unless otherwise agreed to by the land owner.
- Mobile Equipment and Vehicles - Mobile equipment and vehicles that cannot be reused would be buried in the WRF at closure. To prevent degradation of water resources or other contaminant mobilization, all fluids would be drained and batteries removed.
- Roads and Airstrips - On-site roads not required for post-closure long-term monitoring, berms, side-cast material, and road drainage ditches would be ripped to eliminate compaction, re-contoured to blend with the surrounding topography, covered with a layer of growth media, and reseeded or revegetated to follow reclamation plans.

2.2.2 TRANSPORTATION FACILITIES

Cargo would be shipped from marine terminals in Seattle, Washington and Vancouver, British Columbia via ocean barges to a cargo terminal in Bethel. At Bethel, cargo would be transferred to river barges for transport up the Kuskokwim River to the upriver Angyaruaq (Jungjuk) Port site. Cargo would be transported by truck from the port site to the mine site. Figure ES - 3 provides an overview of the distances between primary transportation facilities. Table ES - 6 summarizes the estimated annual amount of ocean and river barge traffic.

- Improvements to the cargo terminal in Bethel with three general cargo berths (one for ocean barges and two for river barges), a 950-foot long berth face, a 200-foot wide concrete ramp for roll-on/roll-off cargo handling, and a 16-acre storage yard. Donlin Gold anticipates a 6 Mgal fuel storage facility may be needed at Bethel. Fuel storage facilities may also need to be expanded in Dutch Harbor.

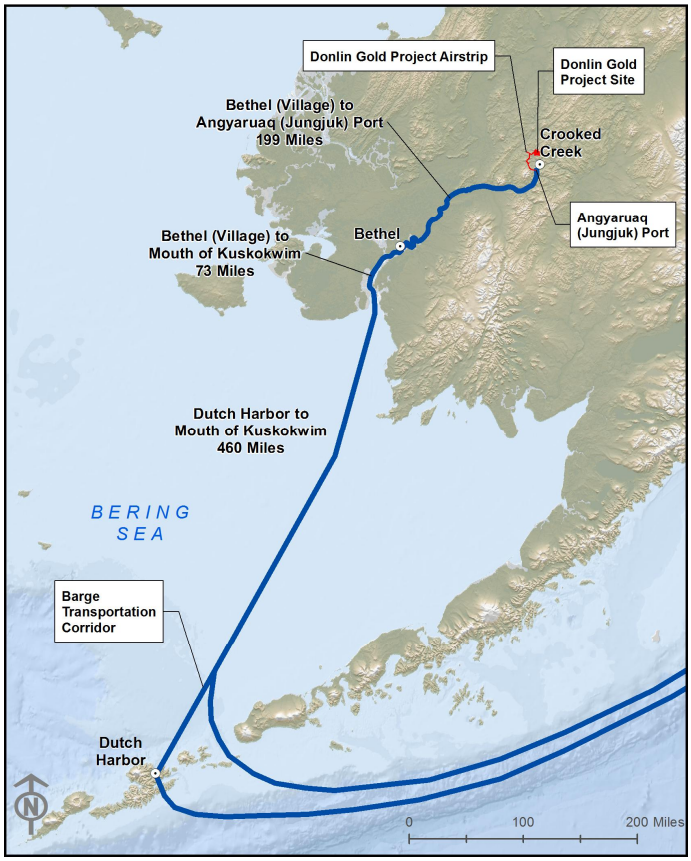

Figure ES - 3: Proposed Transportation Facilities Overview

- A 21-acre upriver Angyaruaq (Jungjuk) Port site including a 700- to 800-foot long wharf, a pocket berth for barges, a ramp to the pocket berth, container handling equipment, and seasonal storage for containers and break-bulk cargo (Figure ES - 5).
- A 30-mile long, two-lane all-season gravel road from the port to the mine site (Figure ES - 4) used for mine support traffic. No public use would be authorized. Table ES - 7 summarizes estimated mine access road traffic.
- A 5,000-foot long by 150-foot wide gravel airstrip capable of supporting DeHavilland Dash 8 and Hercules C-130 aircraft. The airstrip would be approximately nine miles west of the mine site and accessed by a three-mile spur road beginning at the mine access road mile 5.4. Table ES - 8 lists estimated flight frequency.

Table ES - 6: Estimated Annual Ocean and River Barge Traffic

Barge	Transporting	From	To	Number of Round Trips per Season
Ocean	Cargo	Seattle, WA or Vancouver, B.C. area	Bethel	16 during construction 12 during operations
Ocean	Fuel	Seattle WA or Vancouver, B.C. area	Dutch Harbor	7
Ocean	Fuel	Dutch Harbor	Bethel	14
River	Pipe and Equipment	Bethel	Kuskokwim Landing	20 during first two years of pipeline construction
Ocean	Pipe and Equipment	Anchorage	Beluga Landing	20 during first year of pipeline construction
River	Cargo	Bethel	Angyaruaq (Jungjuk) Port Site	50 during construction[1] 64 during operations
River	Fuel	Bethel	Angyaruaq (Jungjuk) Port Site	19 during construction[2] 58 during operations

Notes:
1 Total would be 200 trips over four years. Exact distribution by year would be determined during final design.
2 Average: actual number would range from 9 to 29 annually.

Source: SRK 2013a.

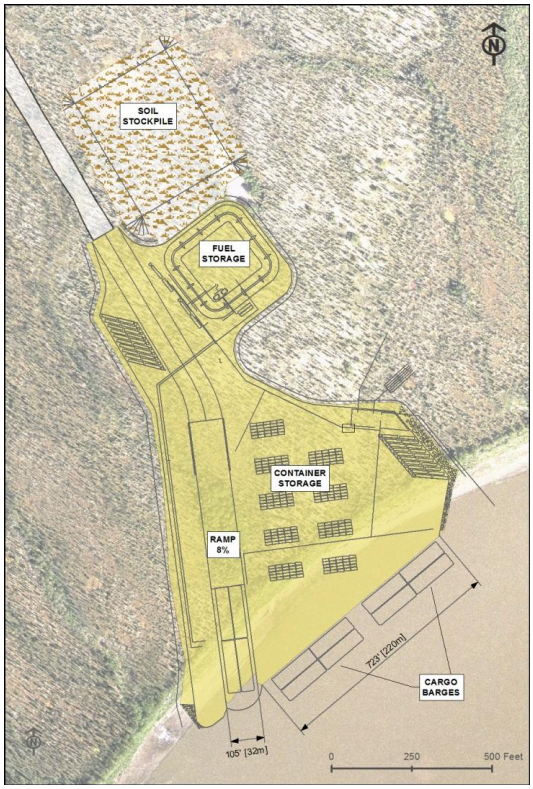

Figure ES - 5: Alternative 2 Angyaruaq (Jungjuk) Port Site

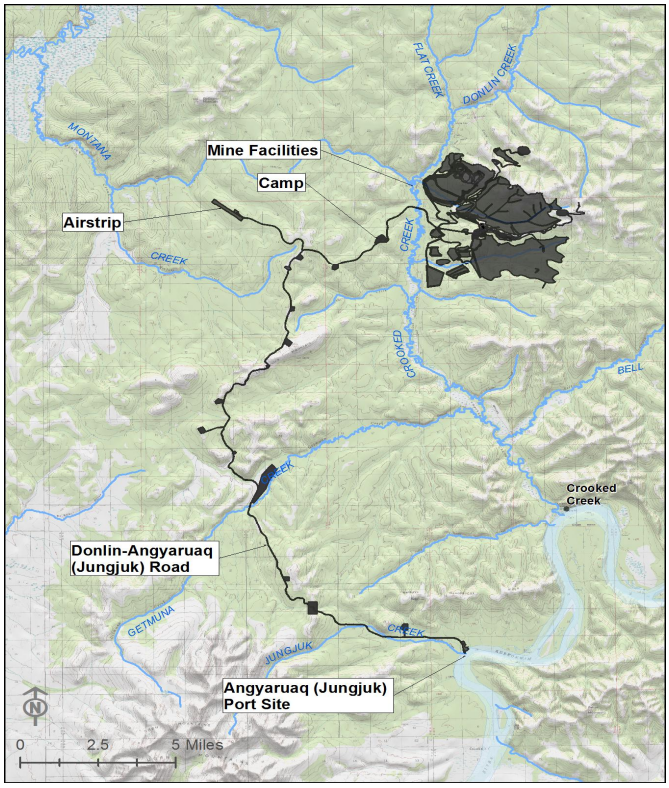

Figure ES - 4: Proposed Angyaruaq (Jungjuk) Port Mine Access Road

Table ES - 7: Estimated Mine Access Road Traffic

Vehicle	Transporting	# of Vehicles	# of Trips per Day	# of Trips per Season
13,500-gallon capacity B-train tanker trucks	Fuel	10	27	2,963
10 tractor units	Cargo	10	27	2,917
	Total	**20**	**54**	**5,880**

Source: SRK 2013a.

Table ES - 8: Estimates of Annual Airport Operations at Mine Airstrip

Phase	Rotary Wing Aircraft	Fixed Wing Aircraft			
		Dash 8 Q300	Twin Otter Series 400	Cargo Plane (TBD)	Total Annual Operations[1]
Construction	TBD – local use in area of mine site development	2,808 (27 flights per week: 3 passenger flights per day, 6 cargo flights per week)	2,190 (3 flights per day)	156 (3 flights per 2 weeks)	5,154
Operations	TBD – casual use	936 (9 flights per week: 1 passenger flight per day, 2 cargo flights per week)	730 (1 flight per day)	52 (1 flight per 2 weeks)	1,718

Notes:

1 Arrivals and departures are counted separately. Operations = total number of arrivals and departures

Source: Fernandez 2013e.

2.2.3 NATURAL GAS PIPELINE

A 14-inch diameter steel pipeline would be constructed to transport natural gas approximately 315 miles from an existing gas pipeline tie-in near Beluga, Alaska, to the mine site power plant (Figure ES - 6). A 14-inch (356 mm) diameter (outside diameter), American Petroleum Institute specification 5L X-52 PSL2 pipe would be used. The pipe would have a baseline wall thickness (WT) of 0.312 inches (7.9 mm), a yield strength of 52,000 pounds per square inch (psi), and a maximum allowable operating pressure (MAOP) of 1,480 psi gauge. Except for two aboveground sections constructed over faults (each approximately 1,300 feet long), the pipeline would be buried within a 51-foot wide ROW on BLM-managed lands, and a 50-foot ROW width elsewhere. Horizontal Directional Drilling (HDD) methods or winter trenching would be used to bury the pipeline at several waterway crossings.

2.2.3.1 Pipeline and Ancillary Facilities

Donlin Gold has applied for authorization of a ROW to install the pipeline and fiber optic cable. Estimated total acreage on federal, state, and ANCSA Corporation lands for the 300-foot wide planning corridor is 11,457 acres (Table ES - 9). Ancillary facilities such as airstrips (supporting construction), construction camps, and storage yards for pipe and equipment would require 2,643 acres. Planned above- ground ancillary facilities include:

- Compressor Station - The compressor station would be constructed on about 1.5 acres of land near MP 0.4. Three fully automated compressors (two required, one standby) of approximately 1,000 horsepower each would be used to deliver natural gas at different rates and pressures as needed.

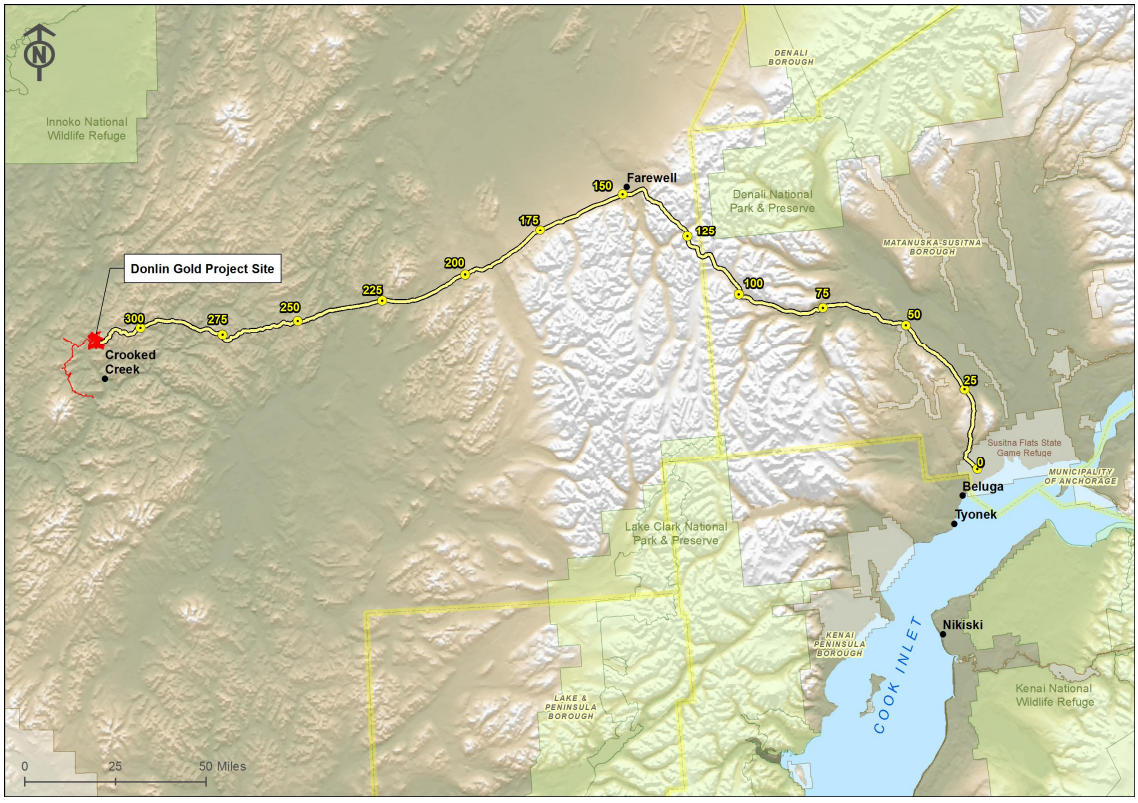

Figure ES - 6: Proposed Pipeline Location

Table ES - 9: Locations and Land Requirements for the Proposed Pipeline

Project Component and Land Owner	Construction Planning Corridor and Ancillary Facilities (acres)		Approximate Length (miles)
	300-foot Planning Corridor	Ancillary Facilities*	
Pipeline			
Federal	3,529	793	97
State	7,504	1,713	206
ANCSA Corporation	424	79	12
Total	**11,457**	**2,585**	**315**
Transmission Line			
State	NA	13	4
ANCSA Corporation	NA	14	4
Total		27	8
Compressor Station			
	NA	1	
Total		**2,643**	

Notes:
* These include access roads, laydown areas, airstrips, borrow areas, and construction camps.
Source: SRK 2013b.

- Transmission Line - Power for the metering station (MP 0) and compressor station (MP 0.4) would be provided by a medium voltage aboveground transmission line from the existing Beluga Power Plant substation.
- Pig Launcher and Receiver Stations - Pig launcher and receiver barrels would be able to launch or receive both maintenance and in-line "smart" pigs. A pig launcher assembly would be located at the start of the pipeline (MP 0) and configured for above-grade, permanent installation. The compressor station (MP 0.4) would have one set of standard design receiver and launcher assemblies. A midpoint receiver/launcher facility would be constructed near Farewell (MP 156), and the terminus of the pipeline at the mine site would have a pig receiver. All of the pig launcher and receiver sites would include aboveground piping, valves, and valve controls.

- Pig Launcher and Receiver Stations - Pig launcher and receiver barrels would be able to launch or receive both maintenance and in-line "smart" pigs. A pig launcher assembly would be located at the start of the pipeline (MP 0) and configured for above-grade, permanent installation. The compressor station (MP 0.4) would have one set of standard design receiver and launcher assemblies. A midpoint receiver/launcher facility would be constructed near Farewell (MP 156), and the terminus of the

pipeline at the mine site would have a pig receiver. All of the pig launcher and receiver sites would include aboveground piping, valves, and valve controls.

- Metering Stations - Two metering stations would include one at the pipeline tie-in (MP 0) and the second at the terminus (mine site) (MP 315). The mine site station would include limited aboveground piping and a module to house the metering equipment. Power to the MP 315 station would be provided by the mine site power plant.
- Main Line Valves (MLVs) – Twenty MLVs would be placed at intervals of 20 miles (or less) along the length of the pipeline. Four would be co-located with other facilities: the Beluga Pipeline (BPL) tie-in, the compressor station, the Farewell pig launcher/receiver facility, and the pipeline terminus at the mine site. Three of these (BPL tie-in, the compressor station, and the pipeline terminus) would function as emergency shutdown valves and would be able to be remotely and/or automatically operated. Mainline valves would close in the event of a pipeline leak to minimize loss of contents.

2.2.3.2 Temporary Work Areas

Temporary work areas would be cleared during construction as necessary outside of the authorized 150-foot construction corridor, including:

- Pipe and Equipment Storage Yards (PSYs) – During construction, pipe and equipment would be stored at yards in Bethel, Beluga, the mine site, the Oil Well Road area, and near the barge landing sites on the Kuskokwim River, serving as primary staging points for pipe materials and also for the majority of the heavy construction equipment. They would supply an estimated 57 smaller PSYs (approximately 1.5-acre each) spaced at about 5-mile intervals along the ROW.
- Borrow Sites – Borrow sites would provide gravel fill material for construction of access and shoofly roads, airstrips, camp pads, PSYs, compressor and meter station pads, and gravel work pads, and include processing plants for crushed and/or screened material. Approximately two million cubic yards of material are estimated for use in the proposed project. Seventy potential borrow sites, ranging from 1 to nearly 50 acres, have been identified.
- Construction Camps – Mobile and stationary construction camps would be used along the pipeline ROW to provide temporary housing for construction crews. About 233 total acres would be required for the seven anticipated 300-person camps and two 100-person camps. Of the seven proposed 300-person camps, only four would be active at any given time. In addition, smaller 30-person camps would be used to support the construction at HDD crossings and compressor station construction.
- Airstrips - Nine new and three existing airstrips would be used to support pipeline construction (Figure ES - 7). Some of the existing airstrips would require upgrades.

2.2.3.3 Temporary Access Roads

Temporary access roads required during construction include a winter access

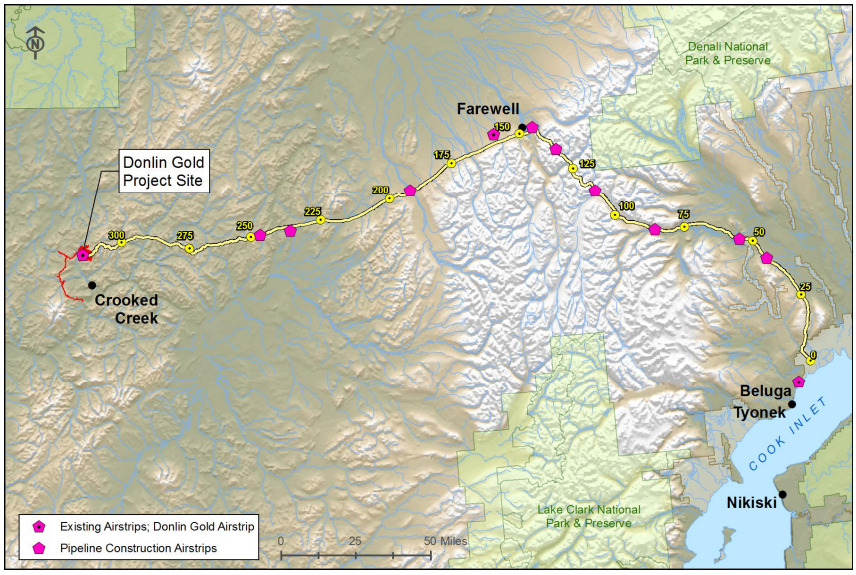

Figure ES - 7: Proposed Airstrip Locations

corridor (ice road) and gravel temporary and shoofly roads. These include:

- Winter Access Corridor – An approximately 46- to 50-mile, 30-foot wide winter access corridor would be constructed to transport equipment and supplies from the Parks Highway via Petersville Road or at Willow via the Willow Creek Parkway. The majority of either route has previously been utilized as commercial/industrial winter trails, and they share a corridor for the final 12 miles approaching the pipeline corridor at its Skwentna River crossing. Nineteen water extraction sites are anticipated for construction with a required total estimated annual extraction volume of 66 Mgal. Water withdrawal procedures would comply with appropriate permits and authorizations.
- Temporary Access Roads and Shoofly Roads – Temporary site access and shoofly roads (short temporary roads) would be required to construct or improve airstrips, borrow sites, water withdrawal sites, and other authorized temporary use areas such as PSYs. The temporary roads would total about 156 miles and cover nearly 49 acres. A total of 75 proposed shoofly roads range from 0.09 miles to 6.91 miles long and total about 77 miles.

2.2.3.4 Water Use and Water Extraction Sites

Water would be needed for construction and operations activities such as dust control, reclamation, and hydrostatic testing, and for HDD crossings. Table ES - 10 lists the estimated water requirements for each HDD crossing. Water withdrawal procedures would comply with appropriate permits and authorizations.

2.2.3.5 Pipeline Construction Material Delivery

Materials and equipment delivered on ocean-capable barges would be temporarily offloaded to the storage yard in Bethel for later transfer to shallow-draft barges capable of transporting loads up the Kuskokwim River to the barge landing/material storage sites on each bank of the river (Kuskokwim East and West) and to the Angyaruaq (Jungjuk) Port. Pipe would also be delivered to the Port of Anchorage and barged to a storage yard at Beluga or sent overland to Oil Well Road/Willow Landing. Pipe and other materials delivered to Beluga would be transported by truck on the existing Beluga area road system to the beginning of the ROW and then to endpoints of delivery along the route. For construction, pipe would be delivered by truck to the intermediate PSYs. For smaller PSYs, which

may not be accessible by standard trucks, a tracked carrier may also be used.

2.2.3.6 General Pipeline Construction Methods

Pipeline construction would be divided into two spreads (crew and equipment) over three to four years. Spread 1 would be 188.6 miles long, operating on the west side of the proposed project site from the Tatina River crossing at approximately MP 127 in the Alaska Range to the mine site.

Spread 2 would be 126.6 miles long, operating from MP 127 to the beginning of the pipeline at the tie-in point at MP 0.

Winter construction would be planned for milepost (MP) 0 to MP 111.6 and MP 144.4 to MP 247.6. Summer construction would be planned for MP 111.6 to MP 144.4 (major stream crossings may be completed during the shoulder season or winter) and MP 247.6 to MP 315.2 (Table ES - 10). The pipeline construction workforce is expected to peak at approximately 650 workers during the two winter construction seasons.

Table ES - 10: Pipeline Construction Execution Sequence

Spread	Season	From Milepost	To Milepost	Length (miles)	ROW Work Start	Pipe Lay Start	Pipe Lay Complete	End of Season
1	Summer 0.5[1]	315.2	247.6	67.6	July – Mine Site	August	October	November – Alpine Ridge
	Winter 1	247	196.6	51	Nov. – Alpine Ridge	January	March	April – Big River
	Summer 1.5	144.4	126.6	17.8	May – S. Fork Kuskokwim River	July	August	September – Tatina River
	Winter 2	144.4	196.6	52.2	Nov – S. Fork Kuskokwim River	January	March	April – Big River
			Subtotal:	**188.6**				
2	Winter 1	0.0	50.8	50.8	Nov – Beluga	January	March	April – Skwentna River
	Winter 1	101.8	111.6	9.8	March – Puntilla Lake	March	April	April – Threemile Creek
	Summer 1.5	111.6	126.6	15	June – Threemile Creek	July	August	September – Tatina River
	Winter 2	101.8	50.8	51	Nov – Puntilla Lake	January	March	April – Skwentna River
			Subtotal:	**126.6**				

Notes:

1 Numbers correlate with a construction year and season within the construction period. For example "0" would be January of the first construction year; Summer 0.5 would be about half way through the first construction year.

Pipeline mobilization is scheduled for S-0.5 and pipeline commissioning is scheduled for S-2.5. Preliminary civil construction of access roads, airstrips, barge landings, PSYs, camps, etc., begins in W-0, one year before the first winter of pipeline construction.

Daily pipe lay rate (in linear feet) and pipe lay duration (in number of days) for each construction section would be estimated during final design.

Source: SRK 2013b.

Most of the proposed pipeline would be constructed using conventional open-cut methods and would occur as a moving assembly line with a construction spread proceeding along the construction ROW in continuous operation. A trench would remain open during construction at any given location along the route for one to three days. Total construction efforts at any single point, from ROW surveying and clearing, to backfill and finish grading, would require three to four months.

The pipeline would be buried below the ground surface to a depth that would meet or exceed USDOT standards (49 CFR 192.327); minimum cover depth is between 18 and 48 inches.

If blasting is needed at trench locations or borrow sites, a Blasting Plan would be developed conforming to all relevant regulations.

Double-jointed, pre-welded straight sections of pipe would be temporarily placed along the excavated pipeline trench, bent as necessary to follow the natural grade and direction changes of the ROW.

Drainage and erosion control measures would be implemented along the pipeline ROW; at facilities such as camps, storage yards, borrow sites, airstrips, and roads; and at permanent facilities (i.e., the compressor station, fiber optic repeater station, pig stations, and MLV locations). Donlin Gold would develop an Erosion and Sediment Control Plan and a Storm Water Pollution Prevention Plan (SWPPP) prior to construction to outline erosion control Best Management Practices (BMPs).

2.2.3.7 Construction Procedures for Specific Site Conditions

Waterbody/Wetland Crossings and Permafrost

Waterbody (including wetlands) crossing construction methods may include HDD, open-cut, dry flume, open-cut dam and pump, flowing water open-cut, and non-flowing water open-cut.

Construction effects on fish and habitat would be minimized by selecting techniques and timing that provide appropriate protection for the specific habitat sensitivity.

HDD drainage-crossing techniques used to protect fish and fish habitats by isolating the in-water work area from the flowing water are proposed for 6 of the 42 major water body crossings.

HDD installation typically includes directional drilling of a small-diameter pilot hole; enlarging the pilot hole to a sufficient diameter to accommodate the pipeline; and pulling the prefabricated pipeline, or pull string, into the enlarged bore hole. Figure ES - 8 illustrates a cross-section of a typical

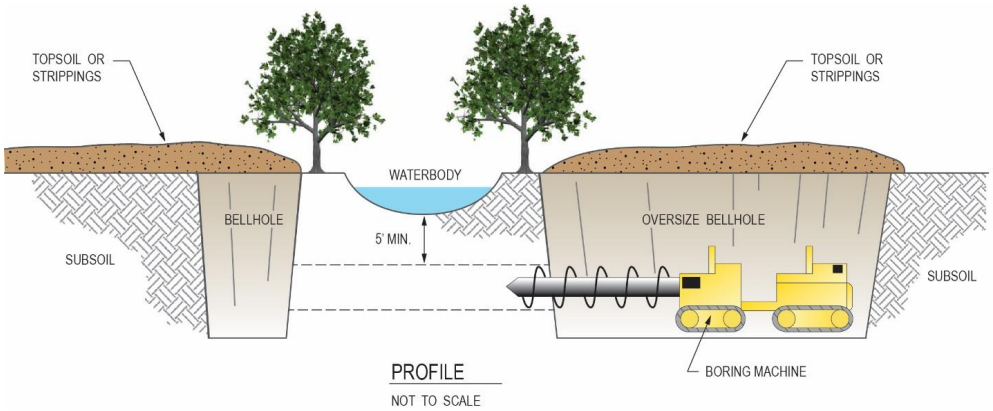

Figure ES - 8: Typical HDD Crossing Cross-Section

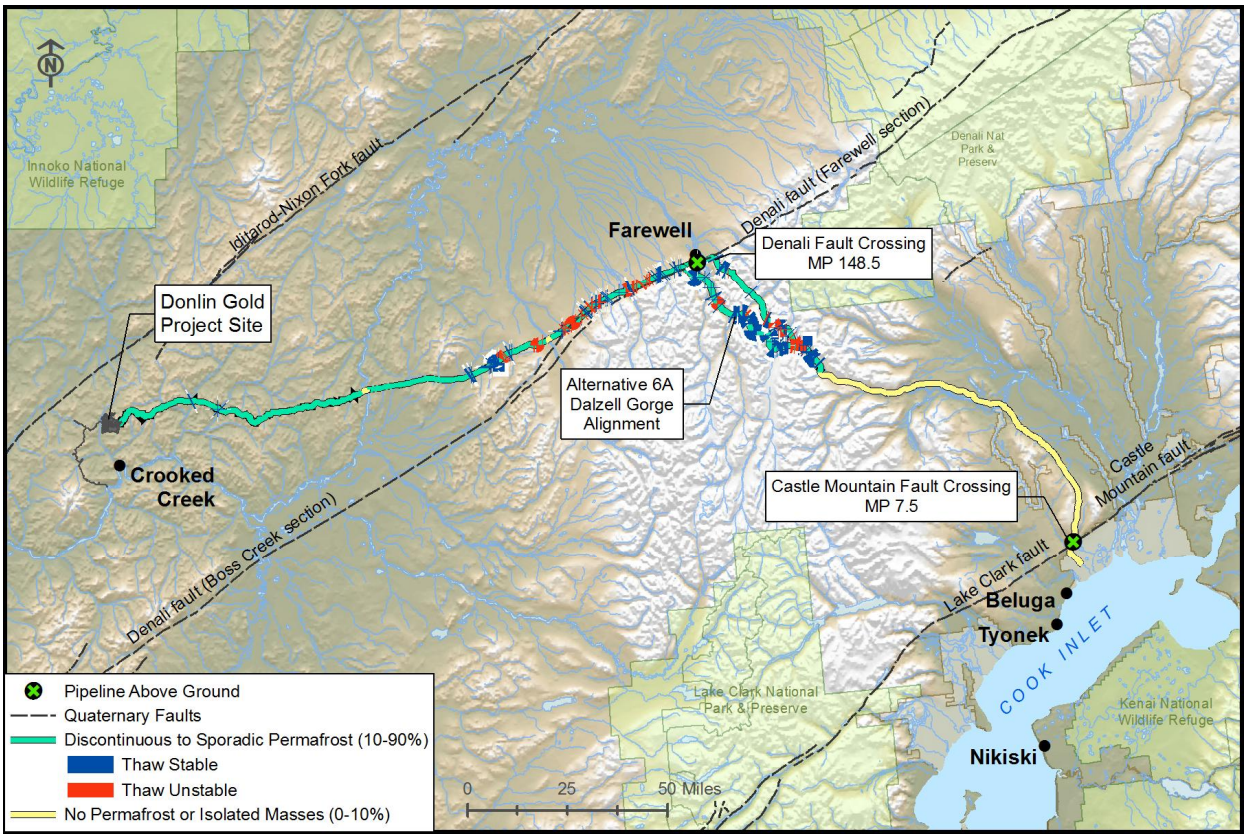

Figure ES - 9: Proposed Pipeline Fault Crossings and Permafrost Distribution

HDD crossing. HDD proposed crossings include:

- Skwentna River (MP 50) - 2,981 feet,
- Happy River (MP 86) - 3,453 feet,
- Kuskokwim River (MP 240) - 7,101 feet,
- East Fork of the George River (MP 283) - 4,532 feet,
- George River (MP 290) - 2,957 feet, and
- North Fork of the George River (MP 298) - 3,281 feet.

Winter construction is planned for 214.8 miles of the pipeline to protect wetlands to the extent possible. Frost packing would be done in winter where soils must be frozen to support construction equipment.

Wetlands underlain by permafrost would be crossed using an ice or snow pad. Wetlands without permafrost would be frost-packed to depths of 3 to 5 feet to drive frost into deeper soils.

The pipeline route crosses more than 100 miles of discontinuous permafrost from approximately MP 100 to MP 205 (Figure ES - 9). Gravel work pads or snow and ice pads would be used in areas of thaw-unstable permafrost or over soft soils that would be unable to support construction equipment, and in areas where removal of the organic layer could allow the permafrost to thaw. Gravel work pads would be left in place after construction, leaving the organic layer beneath intact.

Timber corduroy or mats may be necessary due to terrain or weather conditions to support the pipe and/or equipment. Summer wetland construction would use temporary work pads from imported fill and/or trench spoils or timber mats.

A layer of geotextile or mats would be used to separate fill from vegetation.

Active Fault Crossings

The pipeline would cross two active faults: the Denali-Farewell Fault (MP 148.5) and the Castle Mountain Fault (MP 7.5) (Figure ES - 9). Results of a preliminary fault-crossing stress analysis conducted for both crossings led to a recommended above-grade design with the pipeline in a "Z" configuration at each end of the potential movement zone to ensure flexibility. Final design would allow the pipe to move freely above ground on grade beams and/or vertical support beams during seismic shifting without overstressing the pipe. At both of the above-ground fault crossings the thickness of the pipe wall would be increased, and a steel plate shroud would cover 75 percent of the pipe.

2.2.3.8 Corrosion Protection and Detection Systems

In addition to a three-layer polyethylene coating applied prior to delivery, the proposed pipeline would use a zinc ribbon for cathodic corrosion protection of the steel pipe. Cathodic protection stations for continuity checks would be installed within the permanent ROW at approximately one-mile intervals. System surveys would take place each calendar year, but at intervals not exceeding 15 months, to determine whether cathodic protection levels are adequate.

2.2.3.9 Pipeline Pressure Testing and Commissioning

The entire pipeline would be pressure tested according to USDOT regulations (49 CFR 192) before being placed into service to verify pipe integrity and ability to withstand MAOPs. A detailed Pressure Test Plan would be developed during final design to address all aspects of pressure testing. The pipeline would be pressure tested using water (hydrostatic testing or "hydrotesting"). Testing using water would most likely be in the summer to avoid the need for antifreeze.

After pressure testing, any necessary tie-ins would be made. The welds on the tie-ins would be inspected and the pipeline dried (if required) before commissioning begins. Commissioning would include testing of controls and communication systems before pipeline operation.

2.2.3.10 Pipeline Decommissioning, Abandonment and Reclamation

The State of Alaska and BLM have not determined the future of the pipeline after closure. If decommissioning is required, pipes would be purged and cleaned. All above-ground facilities would be removed, including compressor stations, piping, equipment, buildings, fencing, above-ground river crossing structures, access road culverts, and tanks. Above-ground pipelines would be removed to one foot below grade and underground pipelines would be capped and abandoned in place. Monitoring of the abandoned in-place pipeline would not take place unless required by regulations in place at the time of abandonment. After removal of facilities, cleared land would be contoured as necessary to minimize erosion and revegetated.

2.2.4 MONITORING ACTIVITIES

The objective of monitoring is to provide long-term assessment of resources and to document that compliance goals are being achieved. Monitoring activities are considered part of the Donlin Gold Proposed Action and are detailed in Chapter 2 of the EIS, Alternatives.

2.3 Alternative 3A – Reduced Diesel Barging: LNG-Powered Haul Trucks

Alternative 3A would use LNG instead of diesel to fuel the large (300 plus-ton payload) trucks that would move waste rock and ore from the open pits. These large trucks would account for approximately 75 percent of the total annual diesel consumption under Alternative 2. Trucks hauling cargo and fuel on the mine access road from Angyaruaq (Jungjuk) Port would not be converted to LNG.

The primary differences between Alternative 3A and Alternative 2 would be the addition of an LNG plant and storage tanks near the processing plant, reduced consumption of diesel, reduced barge trips, reduced on-site diesel storage, and increased natural gas consumption.

At present, LNG-powered haul trucks are not currently in full commercial production. The technology to use natural gas products (such as LNG or compressed natural gas) in other industrial applications is proven and equipment manufacturers are actively developing dual-fuel (diesel and natural gas) options for the mining industry.

For Alternative 3A, a 220,000-gallon per day LNG plant would be constructed near the terminus of the natural gas line at the mine site (Figure ES - 10 shows a conceptual layout). The LNG plant, storage containers, and distribution facilities footprint would be within an area that would be disturbed under Alternative 2.

The transportation infrastructure to support mine and pipeline construction and mine operation under Alternative 3A is similar to that of Alternative 2 (see Section 2.2.3). The amount of diesel fuel transported by barge to Dutch Harbor, Bethel, and Angyaruaq (Jungjuk) Port would be reduced from a peak of 42.3 Mgal / year to 13.3 Mgal / year.

Five diesel barge trips would be required between Dutch Harbor and Bethel instead of the 14 trips that would be required under Alternative 2. Additional diesel storage in Bethel would be reduced or eliminated.

Peak annual project-related fuel and cargo barge traffic on the Kuskokwim River would be reduced from an estimated 122 round trips to 83 (from approximately 1.1 round trips per day to approximately 0.7 round trips per day). The diesel storage capacity at Angyaruaq (Jungjuk) Port would be reduced. Compared to Alternative 2, tanker truck traffic on the port access road would be the same during construction but would be reduced by approximately 75 percent during operations.

Natural gas usage would be greater for Alternative 3A (15.5 billion standard cubic feet (BSCF) / year) than for Alternative 2 (11.2 BSCF / year).

The natural gas pipeline proposed under Alternative 2 would not require any modifications to transport the increased amount. Other than increased throughput, the natural gas pipeline component would be identical to Alternative 2.

2.4 Alternative 3B – Reduced Diesel Barging: Diesel Pipeline

Under Alternative 3B, an 18-inch diameter diesel pipeline would be constructed from Cook Inlet to the mine site to virtually

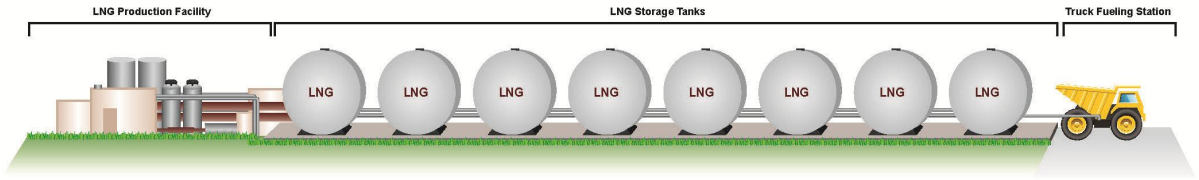

Figure ES - 10: Alternative 3A LNG Plant and Storage Tanks Concept

eliminate project-related diesel barging on the Kuskokwim River during operations. The natural gas pipeline proposed for Alternative 2 would not be constructed; natural gas would not be used. The power plant would be fueled only with diesel.

The diesel pipeline would traverse 334 miles and would be buried within the same corridor proposed for the natural gas pipeline described under Alternative 2 (See Section 2.2.3). This design would require an additional segment between the Tyonek North Foreland Facility and the proposed natural gas pipeline corridor start. This additional segment would cross the Beluga River using HDD.

The pipeline alignment crossing the Castle Mountain and Denali-Farewell faults would be constructed above grade like the natural gas pipeline proposed in Alternative 2.

A leak detection and spill response plan would be developed for review and approval by ADEC. A software-based leak detection system would be installed with connection to the operations center. Regular over-flights to monitor the pipeline would be required. Manual block valves would be installed on each bank at 27 stream crossing locations where the bank-full width of the stream exceeds 100 feet, and check valves would be installed on the downstream side of each crossing.

Improvements to the existing Tyonek North Foreland Barge Facility and transportation of diesel fuel in Cook Inlet would be required. The diesel pipeline would require a robust leak detection system and pre-positioned response infrastructure and equipment, so some construction facilities and most airstrips would be maintained throughout operations. Portions of gravel roads developed during construction along the ROW may be left to provide overland access in the event of spills. Spill response equipment would be staged at major streams, the dock facility, tank farms, and other strategic locations along the pipeline corridor.

Ocean and river barge specifications would be the same as in Alternative 2 until the diesel pipeline is operational, when fewer barges and tugs would be required. There would be fewer trucks hauling diesel on the Angyaruaq (Jungjuk) Port road. All other transportation facility components would be the same as in Alternative 2.

The infrastructure required at the mine site under Alternative 3B would be the same as in Alternative 2, with the exception of the additional fuel storage tanks for use of diesel in the power plant.

2.5 Alternative 4 – Birch Tree Crossing Port

Alternative 4 would move the proposed port site to Birch Tree Crossing (BTC), about 69 river miles below the proposed Angyaruaq (Jungjuk) Port site and 123 river miles upstream from Bethel, reducing the barge distance for freight and diesel to the mine site. The same volume of cargo and diesel fuel would be transported by barge as in Alternative 2, and there would be no other substantive changes to other project components.

The 65-acre BTC Port site would be situated on the Kuskokwim River (Figure ES - 11) consisting of an onshore pad with areas for general storage, fuel storage, a warehouse truck shop, and living accommodations, and a filled area on the riverbank to allow container barges to dock.

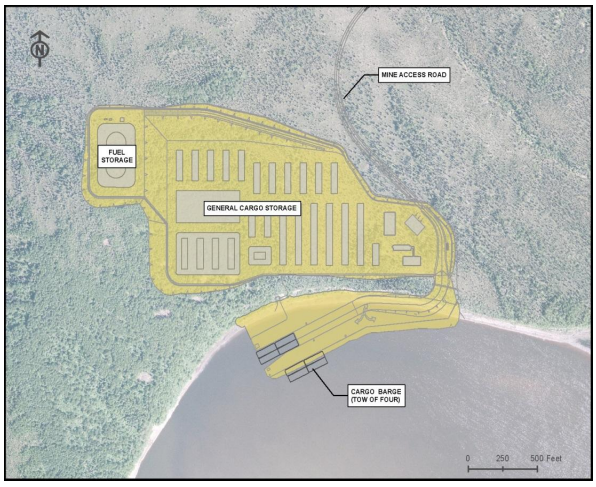

Figure ES - 11: Alternative 4 Birch Tree Crossing Port Site

The estimated annual ocean and river barge trip numbers between Bethel and the port site would be the same as in Alternative 2.

An approximately 75-mile, 30-foot wide, all-season gravel access road (about 2.5 times longer than the mine access road proposed in Alternative 2) would link the BTC port site to the mine site (Figure ES - 12) to transport fuel and cargo.

The road would cross lands owned by TKC and the villages of Aniak, Chuathbaluk, and Crooked Creek. Public use of the road would not be allowed. Fifty borrow sites would be used to provide road construction material. The BTC road would cross 39 waterbodies, four of which are anadromous (Crooked Creek, Iditarod River, Cobalt Creek, and Owhat River). Eight stream crossings would require bridges.

The number of barge and truck trips overall would be the same as proposed in Alternative 2. Positioning the upriver port site at BTC rather than Angyaruaq (Jungjuk) site would not substantially change the total volume of cargo and fuel shipped from the Pacific Northwest to Bethel and to the mine site. The estimated annual ocean and river barge trip numbers would be the same as in Alternative 2.

2.6 Alternative 5A – Dry Stack Tailings

Alternative 5A would use the dry stack tailings (DST) method instead of the subaqueous tailings storage method.

This alternative was developed to avoid the perceived risk of accidental releases from the tailings dam proposed under Alternative 2.

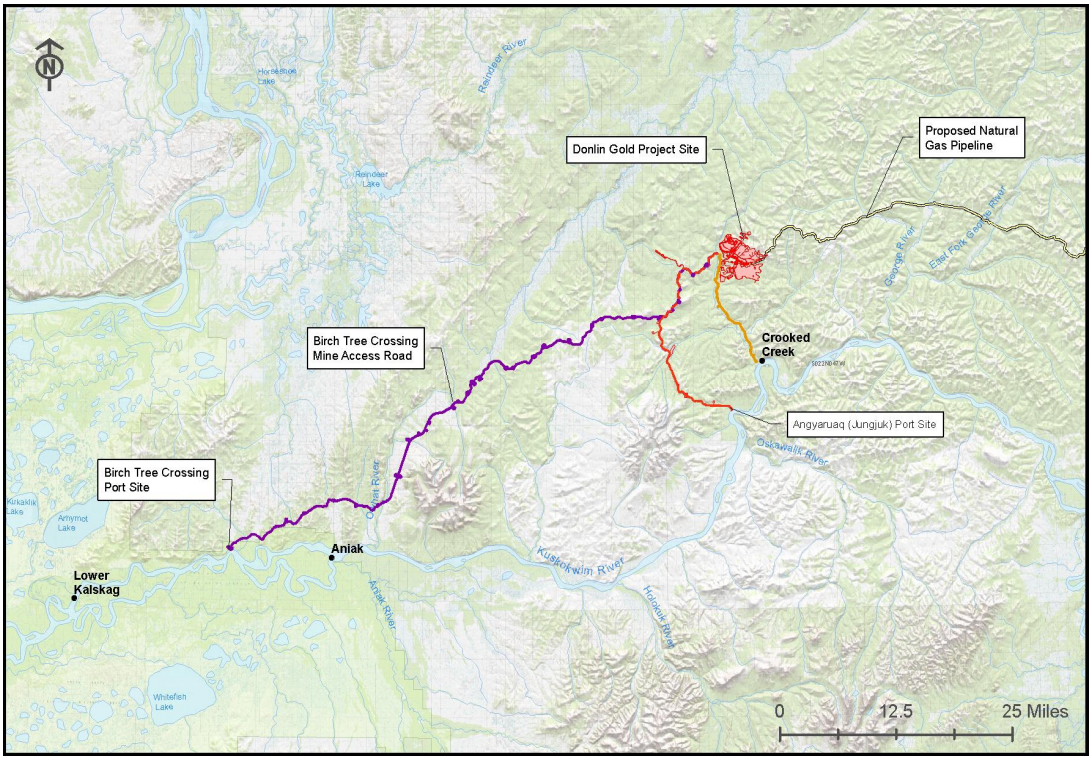

Figure ES - 12: Alternative 4 Birch Tree Crossing Mine Access Road

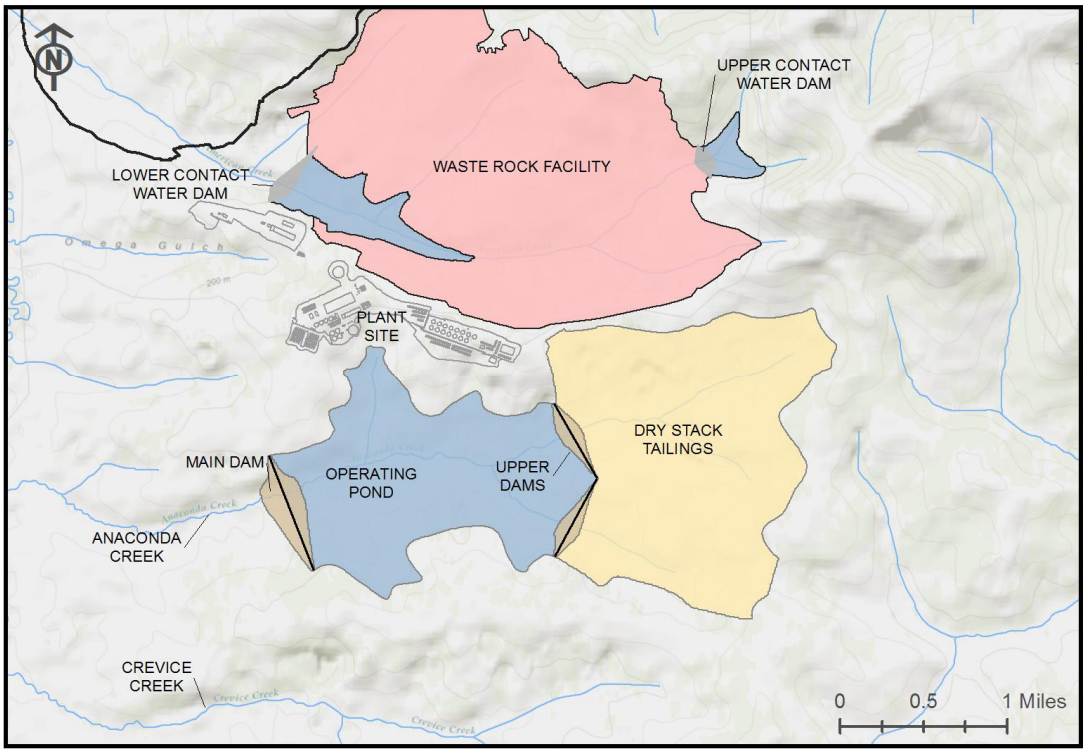

Figure ES - 13: Alternative 5A Dry Stack Tailings

Under Alternative 5A, tailings would be dewatered in a filter plant using specialized equipment to produce a partially saturated, compactable filter cake. This material would be delivered to the TSF by truck, then spread and compacted in thin layers using bulldozers. Residual process water removed from the tailings would be transported to an operating pond via pipeline, and reclaimed water from the pond would be pumped back to the process plant for reuse.

The TSF and operating pond would be in the Anaconda Creek valley in the same general location as in Alternative 2. The TSF would comprise a main dam and two upper dams that split the valley into two cells (Figure ES - 13). The main dam would contain the operating pond, and the upper dams would separate the pond from the DST.

The main dam, upper dams, and operating pond would be fully lined with a 60-mil (1.5 mm) LLDPE liner.

This alternative includes two Options:

- Option 1: The TSF would not be lined with an LLDPE liner. The area would be cleared and grubbed and an underdrain system placed in the major tributaries under the TSF and operating pond to intercept groundwater base flows and infiltration through the DST and convey it to a SRS. Water collecting in the SRS pond would be pumped to the operating pond, lower CWD, or directly to the process plant for use in process.
- Option 2: The DST would be underlain by a pumped overdrain layer throughout the footprint, with an impermeable LLDPE liner below. The rock underdrain and foundation preparation would be completed in the same manner as Option 1.

During closure, the DST would be covered with soil, an LLDPE cover, and vegetated. The operating pond water and any residual solids would be pumped to the open pit. The operating pond and main dam liners would be removed, the dam walls would be breached and graded back into the footprint, and the footprint reclaimed.

2.7 Alternative 6A - Modified Natural Gas Pipeline Alignment: Dalzell Gorge Route

Alternative 6A would realign the natural gas pipeline west between MP 106.5 to 152.7, traversing Dalzell Gorge. This alternative route is carried forward for analysis because it is feasible and would allow comparison of environmental impacts to Alternative 2. The route would deviate from the Alternative 2 alignment at approximately MP 106.5 (Figure ES - 14) trend west, and parallel Happy River for approximately 5 miles before trending northwest at Pass Creek and through Rainy Pass and Dalzell Gorge.

The terrain through the gorge is steep; the route through Rainy Pass starts at an elevation of 2,500 feet above mean sea level (MSL) and climbs to 3,327 feet MSL over about 6 miles.

Approximately 34 miles of this route would be located in the immediate vicinity of, or cross, the Iditarod National Historic Trail (INHT).

Alternative 6A would have mainline valves at approximately MP 119 and 138, 11 borrow sites, and 7 access roads ranging in length from 0.03 miles to nearly 3 miles. New gravel airstrips would be constructed at Pass Creek and Tatina. The planned MP section and construction seasons for the Dalzell Gorge alignment are provided in Table ES - 11. This alignment would cross Happy River and the South Fork of the Kuskokwim River using HDD, which may also be used to cross an area of slope instability in Dalzell Gorge.

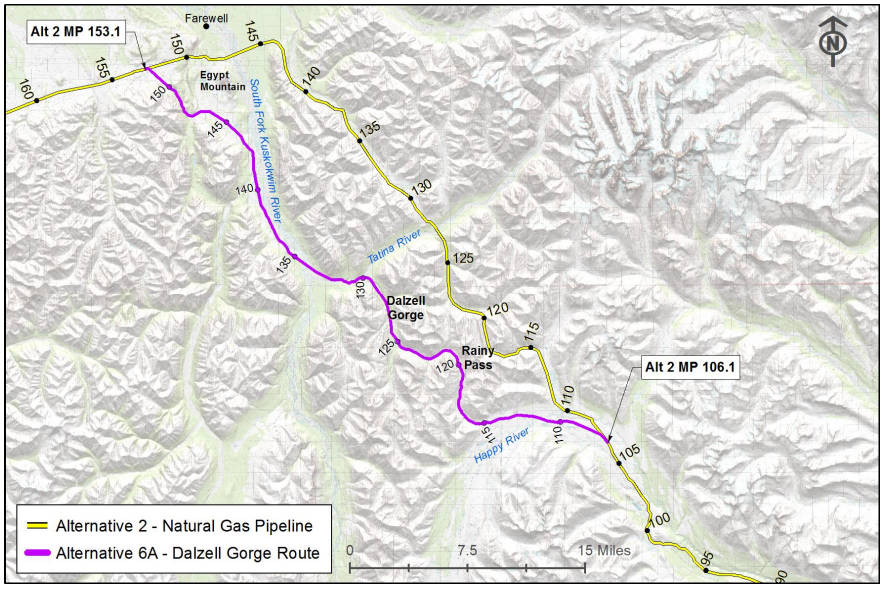

Figure ES - 14: Alternative 6A Dalzell Gorge Route

Table ES - 11: Alternative 6A - Pipeline Construction Execution Sequence

Season	From Milepost	To Milepost	Length (miles)	End-of-Season
Winter Year 1	101.8	114.8	13	April
Summer 1.5	114.8	129.8	15	September
Summer 1.5	129.8	134.8	5	September
Winter Year 2	134.8	189.2	54	April

Source: SRK 2013b.

CHAPTER 3: ENVIRONMENTAL ANALYSIS

The environmental impacts of the project alternatives on 23 resources plus spills, pipeline safety and reliability, and climate change were analyzed by first describing existing conditions and then analyzing potential effects that could occur as a result of the proposed alternatives. Chapter 3 of the EIS, Environmental Analysis, presents details of the existing conditions and effects determined for each resource as well as impact ratings per resource.

Three types of effects were considered:

Direct Effects - caused by the action and occur at the same time and place (40 CFR 1508.8)

Indirect Effects - caused by the action but occur later in time or at a removed distance, but are still reasonably likely to occur (40 CFR 1508.8)

Cumulative Effects - additive or interactive effects that could result from the incremental effect(s) of actions when added to other past, present, and reasonably foreseeable future actions. Reasonably foreseeable future actions are those that are external to the project and likely (or reasonably certain) to occur in the next 30 years. Cumulative actions may increase or decrease the net level of effects.

Direct and indirect effects for each resource or resource use were analyzed and characterized in detail on the basis of factors of intensity (magnitude), duration, extent, and context of the impact. Effects were then summarized by level for each resource. Effects level terms are relative, presented in a continuum from negligible to major. Effects may be beneficial or adverse. Summary effects impact levels include:

- No Effect - the alternative would not affect the resource.
- Negligible - impacts are generally extremely low in intensity (often they cannot be measured or observed), temporary, localized, and do not affect unique resources.
- Minor - impacts tend to be low intensity, temporary duration, and local extent, although common resources may experience more intense, longer-term impacts.
- Moderate - impacts can be of any intensity or duration, although common and important resources may be affected by higher intensity, longer term, or broader extent impacts. Unique resources may be affected by medium or low-intensity impacts, shorter duration or intermittent episodes of impact over a long period, at a local or regional scale.
- Major - impacts are generally medium or high intensity, long term or permanent in duration, of a regional or extended scope, and affect important or unique resources.

A summary of impacts by alternative is provided at the end of the Executive Summary for each project component for all resources (Table ES - 13).

Eight issues identified as of highest importance during scoping are discussed in detail below, including surface water hydrology, groundwater, water quality, air quality, fish and aquatic resources, subsistence resource, and the socioeconomics of the region (see Table ES - 2) for a complete list of issues brought forward for analysis). Climate change is also briefly discussed below as a topic of concern. Hazardous substances used in the mining process were extensively analyzed

for spill potential and are also summarized below.

3.1 Surface Water Hydrology

Surface water resources are waterbodies with surface water flow and movement (as opposed to groundwater or water vapor), such as rivers, streams, lakes, and wetlands. Construction and operation activities of the proposed project have the potential to affect surface water hydrology, or the movement and distribution of surface water. Most water use would be recycled from the tailings pond, but some would be drawn from surface water resources.

The proposed mine site is within the Crooked Creek drainage, a tributary of the Kuskokwim River. Seventeen drainages feed Crooked Creek. Placer mining activities have occurred in several streams in the Crooked Creek drainage. Streamflow monitoring has been ongoing in several locations to collect baseline data.

Expected Effects of Alternatives

No Action Alternative: There would be no impact to surface water hydrology.

Alternative 2 – Donlin Gold's Proposed Action: Surface water hydrology would be most affected within the proposed mine site. Under this alternative, surface water amount and flow would be altered during each project phase in six tributaries of Crooked Creek. Impacts to Crooked Creek would range from low-intensity impacts such as runoff alterations from vegetation removal, to medium- to high-intensity impacts such as decreased flow during operations, and would be temporary to permanent in duration. Approximately 4.7 miles of fish-supporting stream habitat and 5.6 miles of non-fish-supporting stream habitat would be lost. Affected drainages account for about 8 percent of the Crooked Creek watershed.

Flow reductions in Crooked Creek adjacent to the mine site could range from 20 to 100 percent in winter, depending on bedrock and precipitation conditions. Flow in Crooked Creek below the mine site near Crevice Creek would be reduced by 20 percent in winter and 26 percent in dry conditions in later mine life. Impacts to flow in Crooked Creek are expected to decline to low to medium intensity in post-closure.

Reshaped topography would permanently alter surface flow at the mine site. Permanent flow diversion and treatment would begin around year 50 to 55 after closure. The pit lake would be almost full at year 50, when water would be directed through the WTP plant prior to discharge to Crooked Creek.

Surface water impacts from the proposed transportation facilities would range from low intensity for drainage alterations at culvert installations, to medium intensity for riverbed scour effects. Surface water impacts from the proposed pipeline would be primarily during construction, when construction crews and activities would draw on local surface water. Because the high-impact and long-term to permanent effects on surface hydrology are limited to the immediate environs of the proposed mine site, the overall impact effect is considered to be minor to moderate.

Other Alternatives: The effects of other action alternatives on surface water hydrology would be similar to those of Alternative 2. Differences of note include:

- *Alternative 3A (LNG-Powered Haul Trucks)* would have reduced transportation (barging) impacts to surface water hydrology in the Kuskokwim River. Similarly, fuel storage requirements in Bethel and at the proposed Angyaruaq (Jungjuk) Port would be lessened, with proportionally smaller effects

from runoff from disturbed soil. These differences would not alter the summary impact.

- *Alternative 3B (Diesel Pipeline)* has similar differences in effects to those of Alternative 3A. Fuel storage capacity at Angyaruaq (Jungjuk) would be the same as in Alternative 2, due to construction needs, and some additional impacts would occur during construction of the Tyonek-to-Beluga portion of the diesel pipeline. The summary impact would not change.
- *Alternative 4 (BTC Port)* would have fewer shallow sections of river needing to be traversed, leading to slightly lower impacts to surface water hydrology from barging. The summary impact would not change.
- *Alternative 5A (Dry Stack Tailings)* would alter the flow of surface water at the mine similar to Alternative 2, with the exception that the wet tailings design would be exchanged for a dry stack with operating pond design under Alternative 5A. More contact water would be stored and used in milling, resulting in a roughly 25 percent increase in discharge of treated water to Crooked Creek during operations. Post-closure, water flow in the reclaimed mine site would be different from Alternative 2, but the downstream effects would be the same. Approximately 6 percent higher barge traffic would be needed to support the additional equipment and operations and filter plant. The summary impact would not change.
- *Alternative 6A (Dalzell Gorge Route)* would reduce stream crossings but would not change the summary impact.

3.2 Groundwater Hydrology

Groundwater is water contained in underground aquifers (as opposed to surface water), replenished by rainfall and snowmelt, and depleted by human use and natural conditions such as discharge to streams during dry conditions. The Donlin Gold Project would use groundwater for mining operations, particularly the mine pit, which would affect the water table in the area.

Summary of Existing Conditions:

The mine site is associated with three groundwater units, one of which (an alluvial aquifer) contributes a high proportion of flow to Crooked Creek. Considerable groundwater is found in alluvial and sandy deposits along the Kuskokwim River. Groundwater wells are an important source of drinking water for communities in the Project Area along the Kuskokwim River. In addition to feeding Crooked Creek flow in the mine site, groundwater also feeds year-round flow in the Kuskokwim River. Approximately 35 percent of the proposed pipeline route is underlain by shallow groundwater within 3 feet of the land surface.

Expected Effects of Alternatives:

No Action Alternative: There would be no impact to groundwater hydrology.

Alternative 2 – Donlin Gold's Proposed Action: A three-dimensional mathematical model of roughly 85 square miles surrounding the proposed mine site (to a depth of 1,500 feet below the deepest proposed mine area) was constructed using field measurements and field-based estimates for water inputs, outputs, and underground geology. Estimates of the effects of the project on groundwater hydrology are based on this modeling.

The highest intensity groundwater impacts associated with the mine site would occur

during operations. The proposed mine would lower the water table in the area around the proposed pit in order to establish stable pit walls and dry working conditions. Dewatering would be accomplished by pumping groundwater from wells. The deepening and lowering of the water table below the pit level would form a cone of depression (a hydrologic low into which the groundwater would drain), which would continue through the life of the mine. This would reduce or stop groundwater flow to Crooked Creek and drainages east of the creek as groundwater would flow toward the dewatering wells.

The unlined WRF could leak contact water into the groundwater, which would be captured by pit dewatering during operations. After closure, shallow groundwater beneath the WRF would flow into the pit lake. Models predict that the pit lake would continue to be a destination for groundwater flow, and that Crooked Creek would continue permanently to lose water to the groundwater gradient flowing to the pit lake after closure. Groundwater system recovery would cause the cone of depression and water table to slowly recover to the elevation of the post-closure operating lake level about 30 feet below the pit rim. This level would be permanently managed by pumping to maintain hydraulic containment of contact water in the pit lake.

The transportation facilities would have minor effects on groundwater, limited to construction of potable water supply wells for new port facilities. Shallow groundwater exists in the proposed pipeline corridor which would not be impacted past construction.

Summary impacts from Alternative 2 on groundwater hydrology are expected to be minor. However, impacts could be moderate due to substantial uncertainties inherent in estimating bedrock conditions and modelling groundwater flow.

Other Alternatives: The effects of other action alternatives on surface water hydrology would be similar to those of Alternative 2.

3.3 Water Quality

The mine and milling processes would result in discharges of treated water.

Mining increases the rates of physical and chemical processes such as weathering and chemical dissolution of rocks and minerals. Weathering releases rock constituents into surface water, groundwater, and sediment by increased surface area exposure to elements during excavation. Weathering can result in the acid release from rocks containing certain minerals, leading to acidic water, called acid rock drainage.

Summary of Existing Conditions:

Donlin Gold has conducted studies of baseline water quality conditions within the Project Area since 2005. There are no water bodies in the Project Area that are listed as impaired under Section 303(d) of the Clean Water Act, which is the primary law governing surface water quality in the United States.

Two elements of concern in the mine site are mercury and arsenic. Mercury and arsenic compounds are often found in

association with gold-bearing deposits. Naturally elevated mercury and arsenic levels are found sporadically in surface water and groundwater in the vicinity of the proposed mine, with some concentrations exceeding water quality standards. Arsenic and mercury are also both present in sediment samples, especially below mineralized areas.

Water in the Kuskokwim River is generally considered fit for all purposes, and several villages draw drinking water directly from it; however, there are points along the Kuskokwim—naturally mineralized areas and sites of historical mining operations—where concentrations of mercury and other minerals are elevated. Sediment sampling along the Kuskokwim River between Crooked Creek and Bethel showed elevated metal levels, including arsenic and mercury, at all sampling sites.

Expected Effects of Alternatives:

No Action Alternative: There would be no impact to water quality.

Alternative 2: Donlin Gold's Proposed Action: *Mine Site* – Surface water in the American and Anaconda Creek watersheds would be influenced by the creation and perpetual maintenance of managed industrial facilities such as the pit lake, TSF, and CWDs. Due to planned water treatment and water management practices, untreated water from the TSF and pit lake would not leave these watersheds, and would be restricted to facilities within discrete portions of the Project Area. Effects from pit dewatering discharge to Crooked Creek during construction; from pit dewatering, CWD water, and TSF pond water during operations; and from pit lake and SRS water discharged during post-closure would be of low intensity, as all water would be treated to meet the most stringent permit limits prior to discharge. Excess water would be treated and discharged under an Alaska Pollution Discharge Elimination System (APDES) permit. Temperature effects to Crooked Creek below the mine are expected to be minor.

Changes to groundwater quality are expected to result from seepage from the WRF to shallow groundwater and from rain and snowmelt seeping through disturbed rock. Although most seepage would be captured and treated, some may infiltrate shallow groundwater, resulting in localized, high-intensity effects. A complete failure of the TSF SRS could lead to release of untreated water in a matter of weeks.

Impacts to sediment quality would result from increased concentrations of mercury in the Crooked Creek watershed resulting from atmospheric deposition of mercury released by mine facilities. However, the increase in mercury concentrations would be a maximum of 2.5 percent over existing background levels, and would not exceed regulatory guidelines.

Effects outside the immediate mine area are expected to be of low intensity. The impacts of Alternative 2 on water quality associated with the proposed mine site would be considered overall minor to moderate.

Transportation Facilities and Pipeline – During operations, barging in shallow sections may have local effects on sediment and turbidity. Construction of the pipeline would create localized surface water and sediment effects at stream crossings. Discharges of hydrostatic test water would meet the requirements of the applicable APDES General Permit. The transportation facilities and pipeline are expected to have minor impacts on water quality. Negligible groundwater quality impacts are expected from transportation facilities and the pipeline.

Therefore, summary impacts on water quality are expected to be minor to moderate.

Other Alternatives: The effects of other action alternatives on water quality would be similar to those of Alternative 2. Differences of note include:

- Alternative 3A (LNG-Powered Haul Trucks) would have reduced surface water effects such as increases in turbidity arising from barging compared to Alternative 2. The summary impact would not change.
- Alternative 3B (Diesel Pipeline) would have additional impacts in Upper Cook Inlet from the extension of the Tyonek North Foreland Facility dock during construction. The summary impact would not change.
- Alternative 4 (BTC Port) would slightly increase surface water impacts due to stream crossings and runoff along the longer access road, while sediment impacts would be slightly decreased in the Kuskokwim River because of reduced barge distances. The summary impact would not change.
- Alternative 5A (Dry Stack Tailings) - About 25 percent more water would need to be treated on an ongoing basis in operations prior to discharge. Different amounts of contact water would be released into subdrains beneath the dry stack depending on whether it is unlined (Option 1) or lined (Option 2). The main difference between the two is the time it would take for SRS water to clean up to the point that it can be decommissioned in post-closure; that is, roughly 200 years under Option 1, and about 10 to 50 years under either Option 2 or Alternative 2. Option 2 would provide the additional advantage of minimizing (but not preventing) the potential for groundwater quality impacts. Under either option, effects on downgradient water quality in Crooked Creek would be the same as Alternative 2, as the SRS water would be contained and conveyed to the open pit. Increased deposition of mercury to surface water and sediment from fugitive dust, and the potential for increased rates of mercury methylation, are possible. The summary impact would not change.

3.4 Air Quality

The mine and milling processes would result in air emissions that could affect air quality in the region. Contaminants from the mining process such as mercury, dust, and greenhouse gases (GHGs) are of concern for the health of residents and wildlife and vegetation.

Summary of Existing Conditions:

Three major categories of pollutants could be generated by the proposed project: criteria pollutants, hazardous air pollutants, and GHGs. *Criteria pollutants* are air constituents that are harmful in concentrations above a certain threshold—for instance, dust (also known as particulate matter). *Hazardous air pollutants* (HAPs) are toxic substances not ordinarily present in the atmosphere in most places (or only in trace amounts), such as mercury. GHGs are not necessarily toxic but contribute to global climate change.

Three representative pollutants are of significance for this project:

The Project Area contains mercury from existing natural (vegetation, biomass burning, volcanoes, and surface waters) and anthropogenic sources (coal combustion, waste incineration, and historic mining activities). Mercury abatement (reduction) and containment methods have been a

subject of study and improvement in gold processing in recent decades. In the air, the most common form of gaseous mercury deposits can travel long distances before depositing on the ground.

GHGs contribute to climate change. A number of substances potentially released by project components act as GHGs, including carbon dioxide, oxides of nitrogen, and sulfur dioxide.

Oxides of nitrogen are produced by the reaction of gaseous nitrogen and oxygen during combustion. They contribute to acid rain, and to the formation of ozone in the lower atmosphere, which can be harmful to human and wildlife health. Oxides of nitrogen are GHGs.

Donlin Gold implemented an ambient air quality field monitoring program to collect baseline data, which confirmed that ambient pollutant concentrations comply with the respective federal and Alaska state ambient air quality standards (AAQS).

Estimated Effects of Alternatives:

No Action Alternative: There would be no impact to air quality.

Alternative 2: Donlin Gold's Proposed Action: Expected air quality impacts were evaluated based on the results of dispersion modeling (if available) and emissions estimates. No emissions are expected to exceed air quality standards in Alternative 2. Table ES - 12 summarizes emissions under Alternative 2 during construction, operations, and closure.

Mine Site: Emissions modeling for the mine site was performed using a conservative, worst-case fuel scenario. The mine site would be a major source of pollutants such as carbon monoxide, oxides of nitrogen, $PM_{2.5}$, PM_{10}, and volatile organic compounds. In models these pollutants remained below 100 percent of allowable increment, or the amount of additional pollutant that is allowed beyond the baseline pollutant level, the highest being the 24-hour high of $PM_{2.5}$, at 62.2 percent. Ambient mercury modeling (shows expected exposure at the mine site of less than 1 percent of the most stringent standard for annual exposure, with no observable adverse effect.

Construction and closure air quality effects would be considered temporary, while operations impacts would be long-term. Neither construction nor closure would create conditions above permitting thresholds, so are considered low intensity. Operations would have medium intensity impacts as emissions would be above permit thresholds but meet regulatory ambient air standards. Operations emissions would require an air quality permit, but would meet ambient air standards. Therefore, impacts are considered to be minor.

Transportation Facilities and Pipeline: No permit or reporting thresholds for air quality would be exceeded in any project phase for these components. All effects are considered to be local, and ambient air quality standards would not be exceeded. Therefore, impacts are considered to be minor.

The summary impacts of Alternative 2 on air quality for all project components would be minor.

Table ES - 12: Summary of Selected Emissions by Phase & Component

Component/Phase	$PM_{2.5}$	PM_{10}	Total HAPs	Total GHGs[2]
Mine Site				
Construction[3]	117 tons	767 tons	4.6 tons	197,198 tons
Operations and Maintenance	518 tpy	1,630 tpy	25.6 tpy	1,760,469 tpy
Closure	49 tpy	273 tpy	2.4 tpy	194,253 tpy
Transportation Facilities[5]				
Land, Air Transportation. – Construction[3]	161 tons	1,404 tons	7.7 tons	301,482 tons
River Transportation – Construction[3]	9 tpy	9 tpy	nc**	10,574 tpy
Land, Air Transportation - Operations and Maintenance	5 tpy	40 tpy	1 tpy	59,027 tpy
River Transportation – Operations and Maintenance	14 tpy	15 tpy	nc**	18,107 tpy
Pipeline[5]				
Construction[3]	71 tpy	518 tpy	11.3 tpy	259,122 tpy
Operations and Maintenance	0 tpy	0 tpy	0.01 tpy	9,706 tpy

Notes:
1 Emissions shown in this table consist of fugitive, mobile and stationary source emissions.
2 GHGs are expressed in CO_2 equivalents.
3 For the mine site and transportation facilities, this table shows total emissions for the duration of the construction phase (3 to 4 years), not an annual rate as shown for operations and closure. The emissions vary per year so not appropriate to divide by number of years.
4 Stationary source HAP emissions are less than 25 tpy.
5 No values are provided to the closure and reclamation phase for the transportation facilities and pipeline components, because emissions would be negligible for this phase.
nc = not calculated (negligible because HAPs are a subset of Volatile Organic Compounds (VOC) and VOC emissions negligible)
$PM_{2.5}$ and PM_{10} = Particulate matter with an aerodynamic diameter less than or equal to 2.5 and 10 micrometers, respectively
HAPs = Hazardous air pollutants
GHGs = Greenhouse gases
tpy = tons per year

Other Alternatives: The effects of other action alternatives on air quality would be similar to those of Alternative 2. Differences of note include:

- *Alternative 3A (LNG-Powered Haul Trucks)* would reduce the use of diesel fuel and increase consumption of natural gas, creating minor reductions in emissions of carbon monoxide, oxides of nitrogen, particulate matter, sulfur dioxide, volatile organic compounds, and GHGs at the mine site, and reduced emissions from barging compared to Alternative 2. Overall impact would be similar to Alternative 2.
- *Alternative 3B (Diesel Pipeline)* would result in equipment at the mine site being run on diesel, the basis for the worst-case numbers modeled for Alternative 2. In practice, Alternative 2 emissions would be less than those modeled, while Alternative 3B emissions would be at modeled levels, meaning reduced volatile organic compounds but increased carbon monoxide, oxides

of nitrogen, sulfur dioxide, and particulate matter at the mine site compared to Alternative 2. There would also be reduced emissions from barging compared to Alternative 2. Overall impact would be similar to Alternative 2.

- *Alternative 5A (Dry Stack Tailings)* would require a filter plant to dewater tailings and produce filter cake, which would be transported by truck to the Anaconda Creek valley for dry stacking. At closure, the storage facility would be covered and flattened. This alternative would call for increased power generation, resulting in an increase in emissions from the power plant. It would require a 6 percent increase in barge traffic, and would create more fugitive dust than Alternative 2. None of these changes affect the overall magnitude of air quality impacts, which would be minor, same as Alternative 2.

3.5 Fish and Aquatic Resources

Fish and aquatic resources, including habitat characteristics, species abundance, and fisheries, are of central importance to the livelihood of residents of the proposed Project Area.

Existing Condition:

Habitat and Abundance: The Kuskokwim River and many of its tributaries, including the creeks in the Crooked Creek drainage, are designated as Essential Fish Habitat (EFH) under the Magnuson-Stevens Act for Pacific salmon. In Crooked Creek, in addition to populations of Chinook, chum, and coho salmon, limited numbers of sockeye and pink salmon have been recorded and 12 species of resident fish, including Dolly Varden, Arctic grayling, and two species of whitefish.

The proposed transportation corridor includes roughly 199 miles of the Kuskokwim River, habitat characterized by sediment-rich, low-gradient, meandering channels of water depth that fluctuate with tides and seasons. At least 27 species of freshwater fish are found here. Chinook salmon are of special concern in recent years due to low populations, but no endangered or threatened fish species are found in the Kuskokwim River drainage.

Fisheries: The Kuskokwim River subsistence fishery is one of the largest in Alaska. The Kuskokwim drainage contains about 4,600 households in 38 communities. More than 1,500 households engage in subsistence fishing, sharing with additional households. Although there are generally no limits on individual or household take of subsistence salmon, urgent conservation measures have limited harvest of Chinook salmon in recent years. Subsistence use of Chinook and sockeye predominates over commercial take, while commercial harvest of chum is generally greater than subsistence, and commercial use of coho far outweighs subsistence harvest. Sport fisheries also occur in this part of the Kuskokwim, and both commercial and subsistence use of aquatic resources extend into Kuskokwim Bay.

Expected Effects of Alternatives:

No Action Alternative: There would be no impact to fish and aquatic resources.

Alternative 2: Donlin Gold's Proposed Action: *Mine Site*: Construction of the mine would result in habitat removal, stream flow and temperature changes, and sedimentation, all of which would affect fish and aquatic resources, including EFH in the Crooked Creek drainage. Just under 8 miles of streambed would be removed, representing about 8 percent of the Crooked Creek watershed. Habitat in American Creek and Anaconda Creek supports about 200 coho salmon, which would be lost. Stream flow changes would be seasonal, with greatest reductions during winter months, affecting resident fish more than salmon. Permit-mandated water management practices at the mine site would avoid and mitigate effects on downstream aquatic habitat. Impacts of the mine site are expected to be moderate.

Transportation Facilities: Depending on water conditions, barge/tug wakes and propeller wash along the Kuskokwim River may accelerate bank erosion and create riverbed scour, degrading habitat and disturbing fish eggs, larvae, or juveniles. Along the proposed access road and at the port site, development would temporarily degrade water quality and could create long-term barriers to fish passage. Impacts of transportation facilities would be moderate.

Pipeline: The proposed pipeline would affect aquatic resources through runoff to nearby streams, and at crossings. Effects would be limited and mitigated by methods such as HDD or timing pipe installation for least disruption of aquatic life. Impacts would be minor to moderate.

The impact summary for Alternative 2 ranges from minor to moderate.

Other Alternatives: The effects of other action alternatives on fish and aquatic resources would be similar to those of Alternative 2. Differences of note include:

- *Alternative 3A (LNG-Powered Haul Trucks)* would decrease the total number of barge trips per season from 122 to 83, thereby reducing erosion and riverbed scour effects. Summary impacts under Alternative 3A are characterized as minor.
- *Alternative 3B (Diesel Pipeline)* would eliminate fuel barging after the construction phase, reducing the total number of barge trips per season from 122 to 64, thereby reducing erosion and riverbed scour effects. However, impacts during construction would remain, and impacts associated with the access roads would be higher, resulting in summary minor to moderate impacts.
- *Alternative 4 (BTC Port)* would eliminate the upriver portion of the river route, replacing it with a longer access road. Under this alternative, decreased impacts within the river might be offset by new impacts to the wetlands from the extended road. Overall impacts would be the same as Alternative 2.

3.6 Socioeconomics

Potential socioeconomic impacts to employment, income, and sales; tax revenue and other fiscal effects; and public infrastructure and services were analyzed for the regional and out-of-region (i.e., statewide) economies, including 57 potentially affected communities in the Yukon-Kuskokwim region. Analysis included potential beneficial impacts from the project such as new area jobs, along with potential negative impacts, such as patterns of boom and bust cycles in the local economy.

Existing Condition:

The potentially affected area covers a wide geographic range and diverse socioeconomic conditions. With the exception of Bethel, the villages of the Yukon-Kuskokwim region are all generally small, remote communities with subsistence-based economies and few opportunities for year-round employment. Most of these villages have less than 1,000 inhabitants. Government jobs are critical, and communities have felt the effects of federal funding cuts in recent years. Commercial fishing, which is seasonal and subject to fluctuating stocks, is the mainstay of the private economy. These small communities have among the lowest rates of per capita income in Alaska, and among the highest rates of unemployment. Many people leave these small communities for economic opportunities in urban areas.

The City of Bethel, the regional hub for services and transportation and home to more than 20 percent of the population of the Yukon-Kuskokwim region, has much higher employment.

Other affected areas—the locations of proposed transportation facilities and natural gas pipeline—include the City of Unalaska, the Kenai Peninsula Borough, the Matanuska-Susitna Borough, and the Municipality of Anchorage, all with higher populations and wider economic bases.

Small communities in the affected area typically do not levy taxes. The proposed project, in addition to lease revenues to Calista and TKC, and wages to employees, would bring tax revenues to the taxing jurisdictions in the project area.

Infrastructure and services vary widely across the potentially affected communities. Anchorage and surrounding areas provide extensive infrastructure and services in education, transportation, health care, public safety, and other areas, while villages in the Yukon-Kuskokwim region typically provide basic amenities such as an elementary school and a resident health aide for health care. Residents of small communities routinely travel for health care and for higher education. Within the potentially affected area, only the communities in Southcentral Alaska use natural gas; in Western Alaska, both heat and electricity are often provided by diesel fuel, leading to the highest energy costs in the nation.

Estimated Effects of Alternatives

Alternative 1: No Action Alternative: There would be fewer jobs available in the Yukon-Kuskokwim region as a result of termination of Donlin Gold opportunities, largely affecting minority and low-income communities.

Public infrastructure and tax revenue would not be affected by the No Action Alternative, and impacts to the larger state economy would be negligible.

The summary impacts for Alternative 1 would therefore be minor.

Alternative 2: Donlin Gold's Proposed Action: There would be beneficial socioeconomic impacts, particularly for employment within the Yukon-Kuskokwim region. Donlin Gold has an established in-

region, Calista-shareholder hiring preference and has committed to maintaining this throughout the project. Many workers with the skills needed for the construction phase are available within the region, and an estimated 1,600 to 1,900 individuals from Yukon-Kuskokwim communities would be employed during this phase. During operations, an estimated 500 to 600 regional residents would be employed. Employment income could help to offset the current trend of decreasing income from fishing.

Additionally, for each year the project is operational, an estimated 650 jobs and $40 million in wages would be generated statewide through multiplier effects, while sales within the state would increase by $150 million per year. Landowners would receive substantial income through mine site and ROW leases, while state and local governments would receive tax revenue.

Increased employment opportunities would benefit low-income and minority populations in particular. Impacts would vary from temporary to permanent, depending on whether they occur during project construction (temporary), operations (long-term), or closure (permanent). The summary impact for Alternative 2 would be moderate and beneficial.

Other Alternatives: The effects of other action alternatives on socioeconomic resources would be similar to those of Alternative 2, and remain moderate. Differences of note include:

- *Alternative 3A (LNG-Powered Haul Trucks)* would reduce fuel barging and reduce the need for increased tank capacity at Dutch Harbor. Therefore, property tax payments to the City of Unalaska would not increase as under Alternative 2. In addition, fewer transportation jobs would be created (due to reduced fuels shipping, barging, and trucking), fewer expenditures would occur during construction of the transportation facilities, and there would be substantially less expenditure on truck fuel costs resulting from the use of LNG instead of diesel.
- *Alternative 3B (Diesel Pipeline)* would eliminate diesel fuel barging and decrease work and tax income from diesel storage tanks. Pipeline expenditures would increase proportionally including increased employment expenditures for pipeline maintenance. This would offset decreases in employment opportunities and expenditures resulting from reduced diesel shipping and transport. In addition, construction of a new or expanded dock facility in Cook Inlet would increase beneficial effects in the Kenai Peninsula Borough.
- *Alternative 4 (BTC Port)* would reduce river barging distance and require construction of a longer mine access road to the upriver barge landing. The net effect on employment would be similar because the increased workforce required to construct a longer road would offset the decreased workforce required to operate barges.
- *Alternative 6A (Dalzell Gorge Route)* may require more labor and expenditures for horizontal directional drilling (HDD) than Alternative 2. This would enhance the beneficial employment, income, and expenditures impacts during project construction.

3.7 Subsistence

During the scoping meetings, Alaska Native residents in the proposed Project Area emphasized their desire to protect their cultural traditions and subsistence way of life. Historically, the culture and economy of both Yup'ik and Athabascan societies (the two primary Alaska Native groups in the Project Area) revolved around subsistence practices. Rural communities in the Project Area embrace their subsistence traditions as a link to their rich cultural heritage, and as a foundation for today's economy, society, and culture. Examples of potential impacts to subsistence would include reductions in subsistence harvest levels due to changes in availability or abundance of subsistence resources such as fish, restrictions on access to traditional use areas, increased competition for resources, and socio-cultural changes due to employment and shift work.

Existing Conditions:

Subsistence patterns, focusing on community profiles from nine subregions, are described in terms of the seasonal round of harvests of a wide diversity of species, subsistence use areas of community-based groups, and sharing practices. The Kuskokwim River is divided into four subregions: Upper, Central, Lower-Middle, and Lower. Other subregions are the Bering Sea Coast, Mouth of the Yukon River, Lower Yukon River, Middle Yukon River, and Cook Inlet. Each of these subregions shares a common ecology, a common language, and some common harvest patterns.

Subsistence is important for nutritional, economic, social, spiritual, and cultural reasons within these communities. Subsistence resources most common include moose, salmon and other fish, other game, birds and eggs, and vegetation. Wild foods have considerable economic value as part of the modern mixed economy of rural Alaska, and can supplement or partially replace the need for income derived from wage employment.

Estimated Effects of Alternatives

Alternative 1: No Action Alternative: Subsistence resources that had been displaced during the exploration and baseline studies period would likely reoccupy the mine site area, and subsistence users from Crooked Creek may reestablish their use of the area. There would be minor positive effects on subsistence resources and access. There would be no increase in competition from non-local residents for subsistence resources. The loss of jobs and associated income resulting from the termination of Donlin Gold activities in the area would lead to less available income for purchase of fuel or ammunition for subsistence activities, but would increase labor and time available. Summary impacts to subsistence activities would be negligible under the No Action Alternative.

Alternative 2: Donlin Gold's Proposed Action: *Mine Site*: Summary impacts would be minor, except for moderate (beneficial) effects to income. Interviews with knowledgeable subsistence users in eight communities emphasized that new employment and income would increase the ability of households to meet the high costs of subsistence equipment and fuel.

Crooked Creek residents would see continued low-intensity displacement from historical use areas at the mine site, but this displacement would be reduced after closure and would be limited to a small percent of the total subsistence use area.

Most of the impacts would be local (near the mine), except that waterfowl users on the Bering Sea coast may fear that the tailings pond and the pit lake (after mine closure) would contaminate the waterfowl they hunt. Competition for subsistence resources near the mine site would be prevented by Donlin Gold policies of no hunting and fishing from the mine site. However, historical patterns of competition in the Kuskokwim River drainage over moose and Chinook salmon may increase due to new incomes and increased subsistence activity.

Transportation Facilities: The summary impacts for transportation facilities would be minor, except for moderate disturbance to subsistence fishing in narrow reaches of the Kuskokwim River. These impacts are generally low in intensity, except for medium-intensity effects from barging in narrow, shallow segments, and medium-intensity impacts in displacement of access for fish camps near the Angyaruaq (Jungjuk) Port site.

Pipeline: Summary impacts for the pipeline would be minor, except for moderate increased competition near the Farewell airstrip. During construction, intensity of effects on subsistence hunting would be low for subsistence fishing because there would be little overlap between subsistence use areas and the pipeline ROW and the disturbance during construction would be limited to short periods. During operations, the intensity of effects from the buried pipeline would be low. However, increased activity at the Farewell airstrip would be moderate in intensity due to increase in competition, affecting the subsistence uses of the communities of McGrath, Nikolai and Telida.

Other Alternatives: The effects of other action alternatives on subsistence resources would be similar to the effects of Alternative 2. Differences of note include:

- *Alternative 3A (LNG-Powered Haul Trucks)* would reduce fuel barging due to reduced need for diesel, which would reduce impacts to fish and subsistence fishing in narrow reaches of the river. The summary impact would be minor.
- *Alternative 3B (Diesel Pipeline)* would eliminate diesel fuel barging and reduce impacts to fish in narrow reaches of the river. The expansion of the dock near Tyonek to receive diesel tankers would result in low-intensity impacts to marine mammals, including beluga whales. The summary impact would be minor, including reduced impact to subsistence fishing in the affected segments of the Kuskokwim River.
- *Alternative 4 (BTC Port)* would reduce river barging distance by 39 percent, avoiding the narrower reaches of the river above the BTC mine access road and the fishing areas of Aniak, Chuathbaluk, and Napaimute. A longer mine access road (75 miles; 250 percent longer) would disturb casual, summertime subsistence uses in the vicinity of Birch Tree Cross port and mine access road. The summary impact would be minor, including reduced barging distance and increased impacts from the longer mine access road.

3.8 Spill Risk

Although many environmental protections and precautions would be built into the

mine design and operations, including mitigation measures and spill and emergency response plans, regional residents expressed concern about spills during scoping. In particular, there are five hazardous substances of concern: diesel, liquefied natural gas (LNG), mercury, cyanide, and tailings.

Detailed possibility, characteristics, and magnitude of a spill of one of these substances, along with the impacts of a spill under each alternative, are analyzed in Section 3.24, Spill Risk, of the EIS. The analysis focused on nine representative examples of the types of spills that could occur, and do not represent "worst case" possibilities. Instead, the focus is on high-consequence, low probability occurrences, including ocean barge rupture at sea, river barge release, tank farm release, tanker truck release, diesel pipeline release, LNG release, cyanide release, mercury release, and partial tailings dam failure.

Existing Conditions:

Because the area is remote and little infrastructure exists, the existing capacity for response to spills is limited. While the state-wide capacity for oil spill response is well-established, there is minimal capacity to handle a spill of LNG, cyanide, or mercury. These gaps in response capacity would be addressed via new plans created for the proposed project to comply with regulations regarding spill preparedness.

Donlin Gold is a member of Alaska Chadux Corporation (Chadux), an oil spill removal organization that covers Western Alaska and the Aleutians. In the event of a diesel spill, Chadux would provide experienced response personnel and equipment for recovery and cleanup operations.

Estimated Likelihood and Characteristics of a Spill under Each Alternative

Alternative 1: No Action Alternative: There is no likelihood of a diesel, LNG, cyanide, mercury, or tailings spill.

Alternative 2: Donlin Gold's Proposed Action: Spill likelihood was determined based on previous similar operations in the region, the design of barges and storage tanks to prevent and limit spill sizes, and BMPs and mitigation measures. In general, there is a high probability of a small volume (less than 10 gallon) spill from the diesel storage tanks, barges, tanker trucks, and the pipeline, while there is a very low probability of a large volume spill (over 100,000 gallons) from these same sources.

LNG would not be associated with this alternative. Sodium cyanide would be used to separate gold from the ore. Sodium cyanide only poses an environmental threat if handled improperly, and must come in contact with water to pose immediate toxic and acute health dangers. The likelihood of a very large cyanide spill is very low, as the sodium cyanide would be transported as solid briquettes and in special approved containers.

A mercury release by lost cargo or container rupture would have a very low probability. A partial unplanned release of tailings and water from the TSF facility was determined to have a very low probability of a very high volume of material release.

Other Alternatives: The likelihood and fate of spilled hazardous substances under other action alternatives would be similar to those of Alternative 2. Differences of note include:

- *Alternative 3A (LNG-Powered Haul Trucks)* would reduce fuel barging due to reduced need for diesel, which would reduce the likelihood of diesel spills, but add the possibility of an LNG release.

- *Alternative 3B (Diesel Pipeline)* would have the same diesel usage during the construction phase as Alternative 2, with diesel barged up the Kuskokwim River. Spill risk for diesel along the pipeline would be higher during operations, but storage needs would be eliminated at Bethel and Angyaruaq (Jungjuk) Port. Spill risk along the transportation facilities corridor would be eliminated during operations.
- *Alternative 4 (BTC Port)* would have the same spill risk in all phases as Alternative 2, with slightly increased risk of land spills due to longer road length from BTC port to the mine site, and slightly decreased risk of water transportation corridor spills due to shorter barging distance.
- *Alternative 5A (Dry Stack Tailings)* would nearly eliminate the risk of a release of a combined tailings and process affected water release because the tailings would be stored in a DST facility. There would be a dam for operating pond containment, so a risk of release of process affected water would remain.

Effects of Alternatives

A hazardous substance spill would impact multiple resources to differing extents. The impact would range from minor to major depending on the size, extent, and type of spill.

3.9 Climate Change

No standard methodology currently exists to assess how any proposed project's GHG emissions would translate into physical effects on the global environment. However, project GHG contributions are at a level (above 25,000 metric tons) that warrants analysis per Council on Environmental Quality (CEQ) draft guidance from 2014.

Predictions, available data, and information vary widely on current understanding and anticipated impacts of climate change on resources. Some impacts are expected during the project life, such as shifts in migratory bird patterns, early break-up, or changes in vegetation composition. Long-term trends post-closure may change as new information, better models, and greater understanding of climate trends are investigated.

CHAPTER 4: CUMULATIVE EFFECTS

The cumulative impact analysis identifies project impacts that, when combined with impacts from other past, present, and reasonably foreseeable future actions (RFFAs) may become cumulatively significant. Direct effects are limited to the proposed action and alternatives only, while cumulative effects pertain to the additive or interactive effects that would result from the incremental impact of the proposed action and alternatives when added to other past, present, and RFFAs. Cumulative impacts are assessed by combining the potential environmental impacts of the project and alternatives (Chapter 3 of the EIS, Environmental Analysis) with the impacts of other actions that have occurred in the past, are currently occurring, or are proposed in the future in the vicinity of the project.

Not all actions identified in Chapter 4 of the EIS (Cumulative Effects) would have cumulative impacts in all resource areas. Potential impacts for such actions are discussed for the appropriate resource. In some instances in which an action is reasonably foreseeable, quantitative estimates of impacts are not possible and qualitative assessments are provided.

Two factors – place and time - are considered when establishing the affected environment for a cumulative effects analysis, or the spatial and geographical environment and the temporal range of relevant past, present and reasonably foreseeable future projects. Present actions are those that are ongoing and have activities that contribute to potential cumulative effects. Future actions are those that are reasonably foreseeable within the life of the project, or the next 30 years.

The past, present, and reasonably foreseeable future actions considered for this analysis include:

- Oil and gas exploration and development;
- Mining;
- Commercial fishing;
- Transportation;
- Energy and utilities;
- Community development / capital improvement projects;
- Subsistence activities;
- Tourism, recreation, sport hunting, and fishing;
- Scientific research and surveys;
- Land use and planning;
- Self-determination; and
- Global industrial pollutants.

4.1 Cumulative Impacts Summary

Results of the cumulative impacts analysis are summarized below.

4.1.1 PHYSICAL RESOURCES

Geology. All of the action alternatives would have minor to moderate cumulative impacts on bedrock geology, surficial geology and gravel resources, paleontological resources, soils, permafrost, and soil quality.

Geohazards and Seismic Conditions. The proposed project and its alternatives would not directly or indirectly affect geohazards and seismic conditions; therefore, no cumulative effects are identified.

Surface Water Hydrology. The implementation of all action alternatives would have minor to moderate cumulative impacts on surface water hydrology.

Groundwater Hydrology. The incremental contribution of all action alternatives to cumulative effects on groundwater would be minor.

Water Quality. All action alternatives would have minor to moderate cumulative effects for geochemistry and groundwater quality. For surface water quality, cumulative effects would be minor to moderate for all action alternatives except Alternative 5A which would have moderate to major cumulative impacts.

Sediment Quality. All action alternatives would have minor cumulative effects to sediment with except Alternative 5A which would have moderate to major cumulative impacts.

Air Quality. The incremental contribution of all action alternatives to cumulative effects on air quality would be minor.

Noise and Vibration. For all action alternatives with the exception of Alternative 3B, cumulative impacts on noise and vibration would be negligible. Alternative 3B would have a moderate contribution to cumulative noise levels.

4.1.2 BIOLOGICAL RESOURCES

Vegetation and Wetlands. Moderate to major impacts could occur under any of the alternatives in the event of widespread accidental fires or extensive invasive species introduction or spread. The contribution of any of the action alternatives to cumulative

effects on vegetation and wetlands would be moderate.

Wildlife. The cumulative effects to non-threatened birds and terrestrial mammals under all action alternatives would be moderate. For non-threatened marine mammals, the contribution of all actions to cumulative effects would be negligible.

Fish and Aquatic Resources. The cumulative effects on fish and aquatic resources of Alternatives 2, 4, 5A, and 6A are expected to be moderate. Due to reduced barge traffic under Alternatives 3A and 3B, the contribution to cumulative effects on fish and aquatic resources for these alternatives is considered minor to moderate.

Threatened and Endangered Species. The contribution to cumulative effects on threatened and endangered marine mammals from any of the action alternatives is considered to be negligible to minor for most species, except if a right whale or Cook Inlet beluga whale is injured or killed in which case impacts would be moderate to major. Because any potential impacts are expected to be localized, and of low intensity, the contribution of the action alternatives to cumulative effects on threatened and endangered birds is considered minor.

4.1.3 SOCIAL ENVIRONMENT

Land Ownership, Management, and Use. Direct and indirect effects to land use include no change to land ownership, negligible change to land management, and moderate impacts to land use, primarily associated with the cleared ROW. Overall, impacts are considered moderate for this resource, with a moderate contribution to cumulative effects.

Recreation. The direct and indirect effects to recreation under all action alternatives would be minor. The contribution to recreation cumulative effects is also considered minor.

Visual Resources. All of the action alternatives would have moderate direct and indirect impacts to visual resources in the project area. The contribution of alternatives to cumulative effects on visual resources would also be moderate.

Socioeconomics. All action alternatives would have moderate to major beneficial direct and indirect impacts to the socioeconomic environment in the project area. However, the contribution of the action alternatives to cumulative effects on socioeconomics is considered moderate.

Cultural Resources. All of the action alternatives would have moderate direct and indirect impacts to cultural resources in the project area.

Subsistence. The action alternatives would have a minor to moderate impact to subsistence practices and a minor to moderate contribution to cumulative effects on subsistence resources and practices.

Transportation. Alternatives 2, 4, 5A , and 6A would have a minor to moderate contribution to cumulative effects on transportation. Across all transportation elements, Alternative 3A would have a moderate contribution to cumulative effects, and Alternative 3B would have a minor contribution to cumulative effects.

4.1.4 CLIMATE CHANGE

The ultimate effects of the project on climate change (and vice versa) are the results of incremental cumulative effects of many actions. Cumulative impacts for climate change focuses on whether other RFFAs would interact with and alter the projected trends in climate change.

Under the No Action Alternative, past actions are expected to continue, such as existing infrastructure operations,

transportation modes, and energy and utility development and upgrades. There would be no incremental contribution to cumulative effects related to climate change.

For all of the action alternatives, RFFAs would likely induce little additional change to climate change trends. While some large-scale projects are proposed in the region, they are generally still considered to be speculative, and are not considered reasonably foreseeable. The incremental contribution of any action alternatives to cumulative effects related to climate change would be considered minor to moderate.

CHAPTER 5: IMPACT AVOIDANCE, MINIMIZATION, AND MITIGATION

NEPA requires federal agencies to consider appropriate mitigation measures during the NEPA process. Additionally, the Corps Section 10/404 permitting process has very specific requirements for mitigation including a five step process of (1) impact avoidance, (2) minimization, (3) rectifying impacts, (4) reduce and/or (5) resource-specific mitigation measure development and application to compensate for unavoidable impacts under their jurisdiction.

Measures to avoid or minimize impacts to resources identified in this Draft EIS include design features; BMPs (including industry standards or standard permit requirements); agency considered mitigation, or additional measures agencies consider that would further reduce impacts; and monitoring to assess that mitigation measures are achieving the expected results or monitoring for adaptive management may be used as an assessment tool.

The review process for the Department of the Army Permit (Section 10/404) is largely conducted concurrently with the NEPA review process. The Corps' regulatory authority encompasses waters of the U.S. and aquatic resources and ensures that environmental impacts on aquatic resources from projects are avoided, minimized and mitigated.

5.1 Design Features

The Corps views design features as part of the project, and considers Donlin Gold's proposed design measures as inherent to the proposed action (Alternative 2) as well as applicable components of the other alternatives' descriptions. These measures become part of the alternative description, and are considered part of the alternative during the NEPA impact analysis and decision-making process. Impact-reducing design features are described in Table 5.2-1 in Chapter 5 of the EIS.

5.2 Best Management Practices and Permit Requirements

Donlin Gold would follow BMPs, industry standards, and standard permit requirements that are designed to reduce impacts to the environment. The Corps took these BMPs and permit requirements into consideration when assessing the impacts of the project on the resources as described in Chapter 3 of the EIS, Environmental Analysis.

Relevant permits and regulatory requirements are described in Chapter 1 of the EIS, Purpose and Need, and further described in Chapter 5 of the EIS, Impact Avoidance, Minimization, and Mitigation.

5.3 Strain-based Design Special Permit Conditions

Donlin Gold anticipates there will be areas along the pipeline with frost unstable soils or ground movement, and intends to request a Special Permit from PHMSA to allow Strain-Based Design (SBD) of segments of the pipeline. SBD involves advanced metallurgy and engineering to allow the pipe to deform in the longitudinal direction and better maintain its integrity

and safety. PHMSA issues special permits only when consistent with pipeline safety, and will comply with NEPA in deciding whether to issue the special permit. Strain based design special permit conditions are further described in Chapter 5 of the EIS, Impact Avoidance, Minimization, and Mitigation.

5.4 Corps-Considered Mitigation

Mitigation measures were developed by the Corps based on analysis of project impacts, results from a mitigation workshop in July 2015, and input from federal, state, and Tribal cooperating agencies.

Mitigation measures identified in the EIS may not necessarily be required by the Corps and BLM in their RODs, as there may be mitigation measures that are not within federal authority to require in a permit or approval. The ROD would identify those mitigation measures that the agency has committed itself to adopt and explain why any other practicable mitigation measures have not been adopted.

The Corps will continue to refine required mitigation subsequent to completion of the EIS and issuance of the ROD during the Section 10/404 permit application review process. Additional mitigation identified during that process may include project modifications that are in part considered feasible from a cost and constructability perspective. Corps-considered mitigation is further described in Chapter 5 of the EIS, Impact Avoidance, Minimization, and Mitigation.

5.5 Compensatory Mitigation

Compensatory mitigation is a critical tool to help the federal government meet the longstanding national goal of "no net loss" of wetland acreage, function, and value.

For unavoidable impacts to aquatic resources, Donlin Gold will propose compensatory mitigation. All compensatory mitigation required by the Corps must be directly related to the impacts of the proposed project, appropriate to the scope and degree of those impacts, and reasonably enforceable.

Compensatory mitigation is used for permanent and temporal resource losses that are specifically identifiable, reasonably likely to occur, and of importance to the human or aquatic environment. Compensatory mitigation may include: 1) restoration of previously existing wetlands or waters, 2) enhancing or improving functions of existing wetlands or waters, 3) creation of new wetlands or waters, or 4) preservation of existing wetlands or waters. Compensatory mitigation may be provided through permittee-responsible mitigation activities, or as payment for preserving existing wetlands through mitigation banks or in-lieu fees.

Donlin Gold has developed a conceptual Compensatory Mitigation Plan in coordination with federal, state, and local governments and landowners. Specific compensatory mitigation for the proposed Donlin Gold Project will be determined by the Corps during its review of the Section 10/404 permit applications.

BLM can also require compensatory mitigation. Compensatory mitigation is further described in Chapter 5 of the EIS, Impact Avoidance, Minimization, and Mitigation.

5.6 Mitigation Monitoring and Adaptive Management

The Corps will require that Donlin Gold prepare a monitoring and adaptive management plan to monitor success of mitigation efforts, to include a process for making changes to or adding mitigation as needed. This plan will be submitted to the Corps and cooperating agencies for review

and approval. The plan will clearly identify, at a minimum:

- Performance standards;
- What parameters will be monitored;
- Monitoring goals and objectives;
- Where and when monitoring will take place;
- Who will be responsible for monitoring;
- How the information will be evaluated;
- What actions (contingencies, adaptive management, corrections to future actions) will be taken based on the results of monitoring; and
- How the public can get information on mitigation effectiveness and monitoring results.

Following publication of the Final EIS, each agency will prepare their ROD, which will be the formal decision on whether to issue the requested permit as proposed, a modified permit, or no permit. The Corps and BLM RODs would each identify those mitigation measures that the agency has decided to require of the project and that are within the Agency's authority. In addition, the RODs must explain why any other practicable mitigation measures have not been adopted.

BLM also has responsibility to identify the conditions including all required mitigation for any Mineral Leasing Act ROW issued pursuant to the Final EIS. BLM takes a regional approach to mitigation and focuses on achieving the highest benefit to help offset the impacts of projects on Federal lands.

CHAPTER 6: CONSULTATION AND COORDINATION

EIS development included consultation and coordination with agencies and the public. For details regarding locations and dates of meetings, see Chapter 6 of the EIS, Consultation and Coordination.

6.1 Scoping Notice and Public Scoping Meetings

The Corps published the Notice of Intent to prepare the Donlin Gold Project EIS in December 2012, starting the Scoping Period. Also in December, the project website was launched (www.DonlinGoldEIS.com) and the first informational newsletter was circulated to 1,000 stakeholders and 7,450 mailing addresses. The first newsletter contained a self-mailing comment form; other comment submission avenues included the website's comment form; email; U.S. mail; facsimile; or speaking at public meetings.

The formal Scoping Period was December 4, 2012, to March 29, 2013. Several techniques were used to notify the public of the proposed project and EIS, of scheduled public scoping meetings, and to solicit comments. The Corps placed advertisements in regional newspapers and on local radio stations, as well as sent notices by press release and mail.

Public scoping meetings were held in thirteen communities throughout the EIS Analysis Area plus Anchorage from January 2013 through March 2013. Residents could also participate via teleconference to facilitate comments. For communities where public meetings were not held, Tribal representatives selected and sent residents to meetings. Donlin Gold provided travel support. Overall, representatives from 21 neighboring villages attended scoping meetings in the host communities, for a total of 35 villages participating in person. Discussions with potentially affected Tribal governments will continue throughout the project.

6.2 Agency Scoping Meeting

To gather agency input regarding scoping issues, alternatives, and information sources, an agency scoping meeting was held in February 2013 in Anchorage. Attendees included: BLM, USFWS, EPA, ADNR, ADF&G, and Alaska Department of Health and Human Services. Tribal governments that participated in agency scoping meeting included: Village of Crooked Creek, Native Village of Chuathbaluk, and Native Village of Napaimute.

6.3 Government to Government Consultation

The Corps identified 66 federally recognized tribes potentially affected by the project (see Appendix P, Corps Initiation of the Government-to-Government Relationship with Federally Recognized Tribes, of the EIS). The Corps sent a letter of notification and inquiry September 24, 2012, to all recognized tribes offering the opportunity to participate in formal government-to-government consultation, to participate as a cooperating agency, or to simply receive information about the project.

The letters included a Tribal Coordination Plan for project development. The Corps also requested information from the tribes on subsistence, archaeological sites, and traditional cultural properties as well as special expertise regarding any environmental, social, or economic impacts.

As of January 16, 2015, the Corps has held staff level Government-to-Government Tribal coordination meetings regarding the proposed Donlin Gold Project with seven tribes, per Tribal request.

The BLM, conducting a separate Government-to-Government inquiry regarding the project, sent a letter of notification on August 19, 2014, to all the recognized tribes, offering the opportunity to participate in formal government-to-government consultation with the BLM, apart from the Corps. As of March 2015, no responses had been received.

6.4 Comments

During the scoping period, the Corps received 164 unique submissions, including 14 transcripts of public meetings, including 134 oral responses from participants. In all, 2,619 substantive comments were received which were grouped into 438 Statements of Concern which reflect a single point that may have been expressed by several individuals. Issues and concerns expressed by the public and agencies were used as part of the process to develop alternatives (see Appendix B of the EIS for the Scoping Report).

6.5 Additional Public Outreach

The Corps continues to provide project information and updated presentations to stakeholder groups. To date, over 30 supplemental outreach meetings have been held statewide, regionally, and in villages. The Corps has produced five newsletters and plans two more to summarize public comments and announce release of the Final EIS.

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Table ES - 13: Summary of Impacts

Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Section 3.1: Geology						
Mine Site	Bedrock geology impacts would include minor grading during closure (low intensity) to ground disturbances and reshaping of landforms by blasting, excavation and fill (high intensity). There would be permanent alteration of about 505 metric tons (Mt) of ore and 2765 Mt of waste rock from the 1462 acre pit, and final elevation changes of about 600 feet. All effects would be local, limited to the mine footprint. Most bedrock is common, but the ore is unique in that it is an economic resource driving the purpose and need of the project. Disturbance of surficial geology would occur across most areas of the mine site footprint; activities would result in the permanent change to roughly 40 Mt of overburden covering about 9,000 acres. For paleontological resources, there would be a permanent alteration of a total of about 2,765 Mt of potentially fossil-bearing rock (waste rock) covering about 1,462 acres in the pit area, and permanent burial of potential fossil-bearing rock in other areas of the site covering about 6,000 acres. Potential beneficial effects from exposure of new fossils in pit wall outcrops would be dependent on adoption of additional mitigation measures. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	There would be minor differences in the amount of bedrock and rock aggregate resources disturbed and distributed**. Summary impacts would be minor to moderate.**	Same as Alternative 2.
Transportation Facilities	Bedrock geology impacts would include minor excavating or reshaping of landforms along construction areas (low intensity) to blasting, permanent reduction of material resources, and landform scars due to construction (high intensity). Impacts would primarily affect areas along the mine access road with shallow bedrock (less than 2 meters below the surface) which applies to about 16 miles of road, an additional 400 acres at other facilities (airstrip, camp, material sites) and reduction of about 2.8 million cubic yards (cy) of bedrock aggregate resources. Impacts would be local, and common in context. For surficial geology, impacts would involve ground disturbance and landform alterations across a total of about 700 acres and reduction of about 1.5 million cy of gravel resources. **Summary impacts would be minor to moderate.**	Same as Alternative 2, aside from a reduction in utilization of surficial deposits at the Dutch Harbor and Bethel ports. There would be reduced potential impacts on Quaternary fossils along the Kuskokwim River bank. Activities at relay points along the river would be rare under this alternative, as reduction of barge traffic by about one-third would nearly eliminate the need for barge travel during low water conditions. **Summary impacts would be minor to moderate.**	Same as Alternative 2, except that there would be no indirect effects on bedrock from expansion of the Dutch Harbor fuel storage facility. **T**he additional 43 miles of the BTC Road would require roughly 35 percent more cut and fill along slide slopes with cuts into overburden. Potential effects on Quaternary vertebrate fossils along the Kuskokwim River corridor would be reduced. **Summary impacts would be minor to moderate.**	As the types of construction activities would be the same under Alternative 4 as for Alternative 2, the range of intensity of effects on bedrock resources would be the same, although more blasting would be required under Alternative 4. Potential effects on pre-Quaternary paleontological resources would be higher. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Same as Alternative 2.

Table ES - 13: Summary of Impacts

Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Pipeline	Impacts would primarily occur in the western portion of the route where most shallow bedrock exists, and potentially affect about 70 miles of ROW and associated infrastructure (camps, storage yards, airstrip); bedrock material sites covering a total of 500 acres; and a total reduction of about 2.8 million cy of bedrock aggregate resources. Impacts would range from low intensity where only minor excavating or reshaping of the landforms occur, to high intensity where blasting, permanent reduction in material resources, or landform scars such as at borrow pits occur. For surficial geology, potential direct impacts would range from low intensity where only minor grading occurs (e.g., at camps and storage yards), to medium intensity where ROW, road, and airstrip cuts and fills are noticeable, and high intensity at gravel pits where landform scars are obvious and large scale resource reduction occurs. These effects would range from temporary (extending through the construction phase only) to permanent (for some landform alterations), cover local extents (effects within the Project Area), and affect resources considered common to important in context. Gravel resources are widely available in the glaciated deposits of Cook Inlet basin, Skwentna Valley, and braided rivers draining the Alaska Range, and less so in the Kuskokwim Hills. However, there is little demand for gravel resources outside of Cook Inlet basin. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Same as Alternative 2, except some increased impacts would occur at off-ROW diesel pipeline facilities located in shallow bedrock areas. The increase in shallow bedrock cuts at one new airstrip, and increase in cuts in surficial deposits at 5 pipeline material sites, could potentially cause a slight increase in the probability of encountering either dinosaur track fossils in Kuskokwim Group rocks or Pleistocene vertebrates in surficial deposits. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Same as Alternative 2.	One material site (Airfield Quarry) located near MP 108.5 would utilize sedimentary bedrock and impact an area approximately 22 acres in size. **Summary impacts would be minor to moderate.**
Section 3.2: Soils						
Mine Site	Soil disturbance impacts would be medium to high (construction and operations) (compaction to complete removal), medium (closure); permanent in duration, local in extent, and common in context. Permafrost impacts would be low to medium in intensity (TSF, water dams, stockpiles, plants), low probability of medium to high (WRF); long-term to permanent in duration; local in extent; and common in context. Erosion impacts would be low to medium (construction, operations, closure, with BMPs and ESCs measures in design), low (post-closure after stabilization); temporary to long-term in duration; local in extent; and common to important in context. Soil quality impacts (fugitive dust deposition) would be low in intensity, permanent in duration, local to regional (10 miles) in extent, and common in context. **Summary impacts would be minor to moderate (with a low probability of specific major permafrost impacts).**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Slightly greater soil disturbance/removal for TSF and filter plant. Higher erosion of the dry stack surface area. Increase in fugitive dust. Summary impacts would be the same as Alternative 2.	Same as Alternative 2.
Transportation Facilities	Soil disturbance impacts would be low to high (construction and operations) (minor compaction to complete removal), low to medium (closure); permanent in duration, local in extent, and common in context. Permafrost impacts would be low to medium in intensity (all facilities), long-term to permanent in duration; local in extent; and common in context. Erosion impacts would be low to medium (construction, operations, closure, with BMPs and ESCs measures in design), low (post-closure after stabilization) or medium to high (off-road vehicle [ORV] access indirect effect); temporary to long-term in duration, or long-term to permanent (ORV access); local in extent, or local to regional (ORV access); and common to important in context. Soil quality impacts (contaminated sites) would be low to medium, or low (fugitive dust deposition); temporary to long-term (soil contamination) or permanent (fugitive dust deposition, mine access road) in duration; local in extent, and common in context. **Summary impacts would be minor to moderate.**	There would be a small reduction in impacts to Kuskokwim River bank soils at relay points; port soil/permafrost impact reduction; fugitive dust reduction along mine access road. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Soil removal and permafrost disturbance would increase at BTC Port and along mine access road. Additional minor compaction along the temporary ice roads during construction. Less riverbank disturbance would occur at Kuskokwim relay points. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Same as Alternative 2.

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Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Pipeline	Soil disturbance impacts would be low to high (construction) (compaction to complete removal), or low to medium (operations and closure) in intensity; permanent in duration, local in extent, and common in context. Permafrost impacts would be low to medium in intensity (BMPs applied), or low to high (post-closure); long-term to permanent in duration; local in extent; and common (to important, post-closure) in context. Erosion impacts would be low to medium with incidences of high intensity (construction and post-closure, BMPs applied), low (operations and closure) or medium to high (ORV access indirect effects); temporary (construction through closure) to long-term or permanent (ORV access) in duration; local to regional (ORV access) in extent; and common to important in context. Soil quality impacts contaminated sites would be low to medium in intensity, temporary in duration, local in extent, and common to important in context. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Additional soil disturbance with increased ROW length. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Same as Alternative 2.	Higher soil disturbance due to greater area of off ROW-disturbance. **Summary impacts would be minor to moderate.**
Section 3.3: Geohazards and Seismic Conditions						
Mine Site	Earthquake impacts would be low to medium in intensity (TSF dam, water dams, stockpiles, plants, tanks, pit operations) to high (low probability, WRF – lower lifts deform with deep ice-rich soils, and pit closure – wall failure); temporary to permanent in duration, local in extent, and common to important in context. Slope stability would be low to medium in intensity (TSF dam, WRF, FWDs, stockpiles, plants, tanks, pit operations) to high (low probability, lower CWD – landslide activation, and pit closure – pit crest settlement and overtopping); long-term to permanent in duration, local in extent, and common to important in context. Other geohazards (dam seepage) impacts would be medium in intensity (TSF dam, water dams), long-term to permanent in duration, local in extent, and common to important in context. **Summary impacts would be minor to moderate (with a low probability of specific major impacts).**	There would be more medium intensity impacts for the LNG plant, which is designed to withstand ground shaking. Summary impacts would be Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Slightly increased intensity impacts to DST by greater height in operations; slightly less in closure (shorter time to stable landform). Summary impacts would be same as Alternative 2.	Same as Alternative 2.
Transportation Facilities	Earthquake impacts would be low to medium in intensity (roads, bridges, docks, tailings), temporary to long-term in duration, local in extent, and common to important in context. Slope stability would be low to medium in intensity (roads, bridges, docks, tanks), temporary to permanent in duration, local in extent, and common to important in context. Other geohazards (tsunamis, volcanoes) impacts would be low to medium in intensity (roads, bridges, docks, tanks), temporary to long-term in duration, local in extent, and common in context. **Summary impacts would be minor to moderate.**	There would be slightly fewer low to medium intensity impacts through reduction in port fuel tanks. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Longer road increases number of seismic design bridges and material sites with slide potential. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Same as Alternative 2.
Pipeline	Earthquake and slope stability impacts would be low to medium in intensity (pipeline, associated facilities), temporary to long-term in duration, local in extent, and common to important in context. Other geohazards (HDD frac-out, tsunamis, volcanoes) impacts would be low to medium in intensity (pipeline, ROW, roads, airstrips, pads) or high (HDD river crossings, with frac-out impacts to river water quality); temporary in duration, local to regional in extent, and common to important in context. **Summary impacts would be minor to moderate (with low probability of specific major impacts from frac-out).**	Same as Alternative 2.	Seismic impact risk is slightly higher due to tank farm number increase and pipeline length. Summary impacts would be same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	More medium intensity impacts from doubled length of high-risk unstable slopes through the AK Range portion of the pipeline route. Summary impacts would be same as Alternative 2.

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Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Section 3.4: Climate and Meteorology						
Mine Site	Any climate or meteorological impacts that would be attributable to the project would be due to air pollutants emitted during project operations and to the project's small contribution to global greenhouse gas (GHG) emissions. **See Section 3.26, Climate Change, for GHG effects.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Transportation Facilities	Same as Mine Site.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Pipeline	Same as Mine Site.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Section 3.5: Surface Water Hydrology						
Mine Site	Impact intensity would be low (runoff changes) to low to high (Snow Gulch; Crooked Creek flow reductions, depending on creek section, bedrock conditions, and precipitation) to high (American and Anaconda Creeks); long-term (Snow Gulch Reservoir, runoff changes, Crooked Creek) to permanent (American and Anaconda Creeks) in duration; local to regional in extent; and common to important in context. **Summary impacts would be minor to major (during construction and operations) and minor (after closure).**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	There would be reduced discharge to Crevice Creek and Anaconda Creek during the post-closure period, and increased treated water discharge to Crooked Creek. Summary impacts would be same as Alternative 2.	Same as Alternative 2.
Transportation Facilities	Impact intensity would be low (roads, bridges, airstrip, main camp, Angyaruaq [Jungjuk], Bethel, and Dutch Harbor Ports) to low to medium (Kuskokwim River [barging]); long term to permanent or temporary to permanent (Kuskokwim River) in duration; local to regional in extent; and common to important in context. **Summary impacts would be minor.**	There would be fewer fuel trucks on mine access road, and reduced barge-related impacts. **Summary impacts would be minor.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Pipeline	Surface water crossings (open cut, temporary, HDD) impact intensity would be low for water bodies crossed during winter months and low stream crossings, low to medium for potential scour effects; duration would be temporary to permanent, local in duration, and common to important in context. Water use impact intensity would be low (assuming winter availability data collection in final design and volume withdrawn monitored to meet permit requirements); duration would be temporary, local to regional in extent, and common to important in context. Pipeline access and service roads and ice roads and ice pads impact intensity would be low, temporary in duration, local in extent, and common to important in context. Gravel pads impact intensity would be low, temporary to long-term (airstrips) in duration, local in extent, and common in context. Material sites impact intensity would be low, temporary to long-term in duration, local in extent, and common to important in context. **Summary impacts would be minor.**	Same as Alternative 2.	There would be a 334-mile long diesel pipeline, 6 additional stream/river crossings, and minor water use increase for pressure testing ice roads/pads during construction. **Summary impacts would be minor.**	Same as Alternative 2.	Same as Alternative 2.	There would be a 314.2-mile long natural gas pipeline, and 377 stream crossings. **Summary impacts would be minor.**
Section 3.6: Groundwater						
Mine Site	Change in water table impact intensity would be low to high (construction, operations) or low to medium (closure), long-term (construction, operations) to permanent (closure), local in extent, and common to important in context. Change in groundwater use impact intensity would be low, long-term in duration, local in extent, and common to important in context. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Pumping water from the SRS may be required for 200 years for unlined option, 10 to 50 years for lined option. **Summary impacts would be minor to moderate.**	Same as Alternative 2.
Transportation Facilities	Change in water use impacts would be low in intensity, long-term in duration, local in extent, and common to important in context. **Summary impacts would be minor.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Pipeline	Same as Transportation Facilities.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.

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Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Section 3.7: Water Quality						
Mine Site	Surface water quality impacts intensity would be low to high, temporary to long-term in duration, local to regional in extent, and common to important in context. Groundwater quality impact intensity would be low (outside the cone of depression) to high (locations within the mine site, long-term to permanent in duration, local in extent, and common to important in context. Sediment quality impacts would be low in intensity, temporary to long-term in duration, local in extent, and common to important in context. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Treating water from the SRS may be required for 200 years for unlined option, 10 to 50 years for lined option. Lined option would minimize (but not prevent) impacts to groundwater quality. Higher risk of SRS pump failure for unlined option. Pit lake stratification would occur at an approximately 40 percent shallower depth, and metals in pit surface water would likely be higher. Increase in dry stack fugitive dust atmospheric deposition would lower sedimentation quality (BMPs applied). **Summary impacts would be moderate to major.**	Same as Alternative 2.
Transportation Facilities	Surface water quality impacts intensity would be low, temporary to long-term in duration, local in extent, and common to important in context. Groundwater and sediment quality impact intensity would be low, temporary in duration, local in extent, and common to important in context. **Summary impacts would be minor.**	Same as Alternative 2.	Same as Alternative 2.	There would be a lower impact from propeller wash. **Summary impacts would be minor.**	Same as Alternative 2.	Same as Alternative 2.
Pipeline	Surface water quality impacts intensity would be low, temporary to long-term in duration, local in extent, and common to important in context. Groundwater and sediment quality impact intensity would be low, temporary in duration, local in extent, and common to important in context. **Summary impacts would be minor.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Section 3.8: Air Quality						
Mine Site	Air quality impacts would be low in intensity, temporary to long-term in duration, local in extent, and common in context. **Summary impacts would be minor.**	There would be lower impacts from less diesel used, and a slight increase in impacts from more LNG used. **Summary impacts would be minor.**	Emissions of mercury, NO_x, CO, PM, SOx, and GHGs would increase, and emissions of VOCs would decrease, but still be within permitting and regulatory thresholds. **Summary impacts would be minor.**	Same as Alternative 2.	Mobile emissions would increase, and exposure of dry stack surface would increase fugitive emissions, but would be offset by elimination of fugitive dust from TSF beach area. **Summary impacts would be minor.**	Same as Alternative 2.
Transportation Facilities	Air quality impacts would be low in intensity, temporary to long-term in duration, local to regional in extent, and common in context. **Summary impacts would be minor.**	Using LNG haul trucks during operations would result in lower emissions of all pollutants. **Summary impacts would be minor.**	Same as Alternative 2.	Criteria air pollutants and GHG emissions are expected to increase about 3 times. Increase in emissions due to the longer road would be largely offset by the reduced barging emissions. Permitting and regulatory thresholds would still be met. **Summary impacts would be minor.**	During operations there would be a 6% increase in cargo barge traffic compared to Alternative 2. Permitting and regulatory thresholds would still be met. **Summary impacts would be minor.**	Same as Alternative 2.

Table ES - 13: Summary of Impacts

Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Pipeline	Same as Transportation Facilities.	Same as Alternative 2.	Fugitive GHG emissions from the diesel pipeline would be less compared to that of natural gas pipeline. **Summary impacts would be minor.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Section 3.9: Noise and Vibration						
Mine Site	Project-related noise at receptor (A-weighted decibel, day-night sound level [dBA L_{DN}]) impacts intensity would be low, temporary to long-term in duration, local in extent, and common in context. **Summary impacts would be minor.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Transportation Facilities	Same as Mine Site.	Same as Alternative 2.	Same as Alternative 2.	There would be additional heavy equipment operations during construction of longer BTC Road. **Summary impacts would be minor.**	Same as Alternative 2.	Same as Alternative 2.
Pipeline	Project-related noise at receptor (dBA L_{DN}) impacts intensity would be low to high, temporary to long-term in duration, local in extent, and common in context. **Summary impacts would be minor.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Section 3.10: Vegetation						
Mine Site	Direct impacts include removal of 8,954.6 acres of vegetation within the footprint of mine facilities. One unconfirmed population of a rare plant that has no special protection status occurs and would be removed in the TSF footprint; mitigation could include reseeding or replanting where possible. Indirect impacts include increased risk of accidental damage, invasive species introduction and spread, fugitive dust, and changes in water availability. While the vegetation disturbance in the construction areas outside the footprint would be temporary to permanent, the vegetation in the Project Area would be altered for the duration of the project (long-term) or permanently. After mine closure the area would be reclaimed including re-contouring roadways and planting native vegetation and reseeding disturbed areas with native seeds. While these areas are expected to revegetate, they are not likely to have the same plant composition or structure as they did prior to disturbance. The area occupied by the pit lake would not revegetate, and would have permanent vegetation loss. Extended impacts are possible if invasive species spread beyond known locations or become established in new areas. Impacts to vegetation would be to common vegetation type communities aside from the possible rare plant species, **Summary impacts would be moderate.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Direct impacts include removal of 9,401.4 acres of vegetation, an increase of 446 acres compared to Alternative 2 within the footprint of mine facilities at the TSF site. Fugitive dust impacts may increase. **Summary impacts would be moderate.**	Same as Alternative 2.

Table ES - 13: Summary of Impacts

Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Transportation Facilities	Direct impacts include removal of 872.4 acres of vegetation and reclamation at the airstrip, mine access road, Bethel Port expansion area, and Angyaruaq (Jungjuk) Port. Indirect impacts include increased risk of accidental damage, invasive species introduction and spread, fugitive dust, and changes in water availability. Fugitive dust could cause physiological changes to vegetation pending exposure length or level. Ocean barge trips are expected to be 20 trips per year during construction and 26 trips per year during operations. **Summary impacts would be moderate.**	Fugitive dust and invasive species introduction and spread risk may be reduced due to 65% fewer ocean barge trips during operations (17 trips/year during operations) and 68% fewer river trips (83 trips per year), and fewer trucks hauling diesel on the Jungjuk road (about half as many during operations compared to construction). **Summary impacts would be moderate.**	Total barge traffic on the Kuskokwim River would be approximately halved (64 trips/year), reducing invasive species introduction and spread risk. Ocean barge trips would be reduced to 12 trips per year, further reducing risk. **Summary impacts would be moderate.**	Direct impacts to vegetation include removal (approximately 1,605 acres, an increase of 733 acres compared to Alternative 2) and reclamation along a longer mine access road and in the BTC port area. Invasive species introduction and risk would remain the same with increased road length but decreased barge traffic from the BTC port site upriver. **Summary impacts would be moderate.**	Same as Alternative 2.	Same as Alternative 2.
Pipeline	Direct impacts would include 5,963.8 acres of vegetation removal, reclamation, and periodic maintenance (brushing). Potential removal of rare plants is also possible although the two known rare species populations are outside the construction area. Indirect impacts would include invasive species introduction and spread. A much larger area would be affected temporarily during construction than long-term during operations. Access roads for construction would be reclaimed shortly after construction, so impacts would be short-term. After pipeline burial, most of the disturbed area would be revegetated with native seeds, fertilizer, and mulch as required. Changes in vegetation community type composition may be permanent in areas were soil conditions are altered. Only a small proportion of each vegetation community type would be impacted within the greater watershed, and only common types would be impacted. **Summary impacts would be moderate.**	Same as Alternative 2.	Direct impacts would include 6,214.5 acres of vegetation removal, reclamation, and periodic maintenance (brushing), an additional 250.7 acres compared to Alternative 2. Invasive species introduction and spread risk is therefore slightly higher due to increased known presence of invasive plant species near the Tyonek dock. **Summary impacts would be moderate.**	Same as Alternative 2.	Same as Alternative 2.	Direct impacts would include 5,876.5 acres of vegetation removal, 87.5 fewer acres than Alternative 2, along the alternative alignment corridor. **Summary impacts would be moderate.**
Section 3:11: Wetlands						
Mine Site	Direct wetland impacts would affect 5% to more than 25% by acreage of highly- or moderately- functioning wetlands in the American Creek and Anaconda Creek watersheds. Wetland functions would be eliminated and would not be anticipated to return to previous functions after the action that caused the impacts ceased; or within several decades after restoration. Impacts would occur to wetlands that are widespread and typical of the region as well as those that support important local or regional subsistence resources. A total of 6,966 acres would be affected directly including 6,641 from cut and fill and 325 from vegetation clearing. **Summary impacts would be moderate.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Similar to Alternative 2. Wetland acres impacted by tailings storage under Option 1 would be 2,359 acres (140 acres less than Alternative 2 at 2,499 acres); under Option 2 would be 2,593 acres (94 acres more than Alternative 2). **Summary impacts would be moderate.**	Same as Alternative 2.

Table ES - 13: Summary of Impacts

Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Transportation Facilities	Direct wetland impacts would be a 1% reduction in wetland abundance from construction and operations, and potential indirect impacts to 7-14% of high functioning wetlands. There may be potential increases in wetland erosion rates resulting from barge wake energy, with an increase of 2-8% of river tractive energy along Kuskokwim River shorelines; impacts would be low or medium. Wetlands would be affected in the vicinity of the mine access road, port, and airstrip within the Crooked Creek watershed. The impacts would be permanent for the road and airstrip but temporary for reclaimed areas. Barge impacts would occur during operations. Common wetland vegetation types would be affected on land. Shoreline wetlands may be important in supporting anadromous fish streams and subsistence resources. **Summary impacts would be moderate.**	Fewer barge trips (122 reduced to 83 round trips) would reduce potential barge-related river wetland erosion rates. There would be fewer truck trips between the port and mine site, which may lessen dust and gravel spray impacts to wetlands. **Summary impacts would be moderate.**	Barge traffic-induced river wetland erosion rates would be reduced by elimination of fuel barging after construction. Cargo barging would remain the same as Alternative 2. Estimated barge traffic would be reduced from 122 to 64 round trips. **Summary impacts would be moderate.**	Construction of the BTC road, BTC port, mine airstrip and mine access road would directly impact 1,120 additional acres of wetlands. Some impacts would be permanent as the road and airstrip would remain open. **Summary impacts would be moderate.**	Same as Alternative 2.	Same as Alternative 2.
Pipeline	Direct impacts to wetlands would be a 5% reduction in abundance (2,339.5 acres total), and potential reduction of 5-8 percent of high functioning wetlands. Construction impacts would be highest, and operations would be lower in intensity. Impacts would be short-term during construction, as reclamation would take place immediately after construction ended. Functions may be reduced for extended periods. About 21% of the pipeline ROW would cross permafrost-based wetlands, 8% of which are unstable permafrost soils which may be difficult to restore as wetlands. Impacts would be regional along small areas of wetlands in multiple watersheds. Wetland vegetation types are common. **Summary impacts would be moderate.**	Same as Alternative 2.	Construction of the diesel pipeline would impact an additional 226.5 acres of wetlands compared to Alternative 2 (2,566.0 acres total). **Summary impacts would be moderate.**	Same as Alternative 2.	Same as Alternative 2.	Direct impacts to wetlands would increase by 98 acres compared to Alternative 2. Most of the additional wetland construction would take place during winter. High functioning wetland impacts would be variable. 24% of the route crosses permafrost stable soils, and 8% crosses unstable permafrost soils. **Summary impacts would be moderate.**

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Section 3.12: Wildlife						
Mine Site	*Terrestrial mammals:* impacts to habitat include removal or modification of vegetation types, habitat fragmentation, behavioral disturbance, exposure to potentially toxic materials, potential for injury and mortality, and potential for accidental fires that impact habitat. Invasive species impacts could include invasive aquatic plant species and Norway rat impacting habitat in limited locations. Indirect impacts by behavioral disturbance (from mine site blasting or noise from heavy machinery) and barriers to movement impacts would occur during construction and operations. Injury and mortality impacts would be temporary and localized to construction or transportation facility areas. Increased hunting and trapping pressure impacts may occur during operations with increased access, although these activities would not be permitted. **Summary impacts would be minor to moderate.** *Marine mammals:* **Summary impacts would be no impacts.** *Birds:* long-term habitat loss or alteration impacts would occur during construction and operations with vegetation removal. Some habitat may increase for species that prefer early successional areas and edges. Environmental contamination impacts (from tailings pond, contact water pond, and pit lake) would be permanent. Blasting and machinery operation noise may lead to birds avoiding the mine site for the duration of operations. Risk of injury or mortality from collisions impacts would occur for construction and operations. Predators attracted to organic waste impacts would occur during operations, but be mitigated through management plans. **Summary impacts would be minor to moderate.**	Fewer fuel trucks reduces collision risk for terrestrial mammals. **Summary impacts would be minor to moderate.**	Fewer fuel trucks reduces collision risk for terrestrial mammals. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Transportation Facilities	*Terrestrial mammals:* habitat modification impacts intensity would be low during construction and operations as less habitat would be impacted than in other components. Invasive species impacts to habitat may include introduction or spread of aquatic invasive plants or Norway rats on barges, but risk would be low due to mitigation through management plans. Behavioral disturbance impacts would be high during construction but lower during operations along the river and road corridors. Barriers to movement impacts may occur along roads throughout construction and operations. Injury and mortality impacts may occur during construction and through operations along road corridors primarily, and continue throughout operations. Increased hunting and trapping pressure impacts would be low due to controlled access during operations. **Summary impacts would be minor to moderate.** *Marine mammals:* Behavioral disturbance or injury or mortality impacts would be low in intensity, unlikely, and limited to potential impacts from barges. Due to the MMPA, the context of any impact would be important. **Summary impacts would be negligible to minor.** *Birds:* Habitat loss impacts would be medium as there is an abundance of habitat in surrounding areas. Blasting and noise impacts would occur during construction at material sites, and may cause avoidance behavior. Collision impacts are low to medium intensity and are expected to be in low number, causing no population level impacts. **Summary impacts would be minor to moderate.**	Summary impacts would be same as Alternative 2 (but lower disturbance to riparian mammals due to fewer barge trips; fewer fuel trucks lowers collision risk).	Summary impacts would be same as Alternative 2 (lowest amount of disturbance to riparian mammals due to lower number of barge trips; fewer fuel trucks lowers collision risk).	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.

Table ES - 13: Summary of Impacts

Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Pipeline	*Terrestrial mammals:* habitat modification would mainly be temporary during construction. Invasive species impacts may include invasive plant introduction from existing infrastructure impacting habitat but would be mitigated by management plans. Behavioral disturbance impacts may be high due to construction noise during construction but not during operations as the pipeline would be buried. Barriers to movement impacts and injury and mortality impacts would be low for mobile species or higher for burrow and denning species, during construction. Increased hunting and trapping pressure may occur with more use and access within the area. **Summary impacts would be minor to moderate.** *Marine mammals:* **For operations and closure, the Summary impacts would be no effect. For construction, the impacts would be the same as for Transportation Facilities.** *Birds:* Habitat loss impacts would occur during construction and through operations as vegetation was reclaimed or revegetated. Noise would continue through construction. During operations, impacts would be lower as the pipeline would be buried. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Impacts may be slighter higher for mammals with a longer pipeline route. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Same as Alternative 2.	Slightly higher potential for impacts to caribou or bison during construction. **Summary impacts would be minor to moderate.**
Section 3.13: Fish and Aquatic						
Mine Site	Permanent in-stream habitat removal and disturbance or loss of fish and benthic biota would occur on 8 miles within 5 drainages during all phases (Snow Gulch, Lewis Gulch, American Creek, Omega Gulch, Anaconda Creek). Tributaries impacted by water management practices would experience permanent loss of aquatic habitats, fish, and other aquatic species within the Crooked Creek watershed. Streamflow reductions in Crooked Creek near the MSA would be moderate (major in a High K scenario). Water quality impacts would be low. Wetland impacts to aquatic habitats would be permanent due to effects of reduced surface water runoff and reduced water quality functions within several drainages east of Crooked Creek. Context for lower reaches of Crooked Creek, American and Anaconda Creeks, the mainstem of Crooked Creek from its mouth to Donlin Creek, and Getmuna and Bell Creeks are important as they are regulated as EFH. Reduced groundwater inflows to Crooked Creek would impact stream temperature during operations. Erosion and stream sedimentation would be controlled and mitigated to reduce impacts. **Summary impacts would be moderate.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Reduced storage requirements within the TSF would lessen the risk of potential dam failure and release of slurry materials downstream to Anaconda and Crooked Creeks. **Summary impacts would be moderate.**	Same as Alternative 2.

Table ES - 13: Summary of Impacts

Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Transportation Facilities	Bank erosion and riverbed scour along the Kuskokwim River could cause minor to moderate habitat disruption (major in shallow, narrow channels) and increased suspended sediment concentrations and turbidity, displacement or stranding of young-of-year fish along certain shallow-gradient riverbanks and bars, behavioral disturbance to resident and anadromous fish life stages (migration, rearing/feeding, and spawning, and propeller strikes or shear forces causing fish injuries or mortalities or alteration of fish behavior and migration. Impacts would occur during construction and operations at different times of the year based on fish migration and behavior patterns. Fish species impacted are common to the Kuskokwim River area but important in the context of EFH and as anadromous salmon species. Stream crossings along the mine site road may increase sedimentation or cause other impacts to streams; impacts would be mitigated by BMPs. Main tributaries impacted include upper Getmuna Creek and Crooked Creek during construction and some impacts during operations. **Summary impacts would be moderate.**	Barge trip reduction would result in a reduction in the amount of tug and barge-generated wakes, prop wash, and riverbed scour. Impacts would be similar to Alternative 2. **Summary impacts would be moderate.**	Barge trip reduction would result in a reduction in the amount of tug and barge-generated wakes, prop wash, and riverbed scour. Almost no travel would be required during low flow conditions. Impacts would be similar to Alternative 2. **Summary impacts would be moderate.**	Due to the shorter river distance traveled by barges, the intensity of impacts would be reduced for wave energy on water quality and fish displacement/stranding, for tug propeller forces on bed scouring and aquatic habitat, for construction and operations phases. Impacts from the longer mine access road would be increased risk of sedimentation from stream crossings, particularly during construction. **Summary impacts would be moderate.**	Same as Alternative 2.	Same as Alternative 2.
Pipeline	Impacts to anadromous or resident fish and aquatic habitats would occur along the pipeline ROW, low to medium intensity, with highest impacts where HDD methods are not used for stream crossings. Impacts would include stormwater runoff, suspended soils, and altered flows from disturbed soils; water withdrawals for ice-road construction, construction of pipeline used open-trench methods, and water releases from pipeline hydrotesting. Impacts would mainly occur during construction. Crossings classified as EFH would be important in context. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Increased disturbance would occur with additional construction acres from Tyonek to Beluga for the diesel pipeline. During operations, an additional 24 barge trips would arrive at the terminal annually. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Same as Alternative 2.	There would be slightly fewer (22 compared to 28) stream crossings at sites with permafrost or erodible soils and confirmed fish presence. Impacts would be similar to Alternative 2. **Summary impacts would be minor to moderate.**
Section 3.14: Threatened and Endangered Species						
Mine Site	**Summary impacts would be no impacts.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.

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Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Transportation Facilities	*Eiders:* During construction and operations, eiders may experience during certain times of the year (when barge traffic and certain behaviors overlap) behavioral disturbance from increased barge traffic, and have risk of injury or mortality from collisions with barges. There is also risk of contamination, injury, or death from fuel or chemical spills. Large numbers of Steller's eiders use habitat within Kuskokwim Bay for spring staging and during a 3-week molt period following breeding. Spectacled eiders use habitat in the coastal area from the west side of the Kuskokwim River north and west along the coast. The most important barge timing overlap is when barges pass by part of the area where Steller's eiders molt between July and November. Context would be unique for Steller's eider and important for spectacled eider due to their ESA-listed status. Marine mammals: During construction and operations, behavioral disturbance is possible from barge traffic or collisions with ocean barges causing death or injury. Noise from vessel traffic and port and dock construction noise may interfere with marine mammal communication or cause deflection or avoidance of the river, dock, and port areas. Injuries could include lacerations to serious injury or mortality from propeller cuts to blunt force trauma. Contamination impacts are also possible. The potential for collisions increases when vessels travel higher than speeds of 15 knots. Vessel strike around the Kuskokwim River and at the river mouth would be minimized by relatively low speed. Cargo river barges are expected to travel at 4 knots upriver and 10 knots downriver when unloaded. Fuel barges would travel at 3.5 knots upriver, and 10 knots downriver. Distribution of right whales in particular is limited in barge travel areas, further minimizing potential for collisions. **Summary impacts would be minor (eiders). Summary impacts would be negligible to minor (marine mammals), except if a right whale or Cook Inlet beluga whale is injured or killed in which case impacts would be moderate to major.**	The reduced number of barge trips reduces risk of adverse impacts to eiders. **Summary impacts would be the same as Alternative 2.**	The overall chance of adverse impacts to eiders and marine mammals would be reduced by lower barge activity, but cargo barge activity would remain the same. **Summary impacts would be the same as Alternative 2.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Pipeline	Same as Mine Site.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Section 3.15: Land Ownership, Management, and Use						
Mine Site	Change in land ownership impact intensity would be low (17(b) easements), permanent in duration, local in extent, and important in context. Change in land management would be no impact, as action is consistent with management plans. Change in land use would be low (closure) to high (construction and operations) (beneficial, with positive changes to lands from the vantage of the land owner), long-term (construction and operations) to permanent (closure) in duration, local in extent, and important in context, or unique (mineral resource rare on Calista/TKC lands impacted). **Summary impacts would be major and beneficial.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.

Table ES - 13: Summary of Impacts

Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Transportation Facilities	Change in land ownership and change in land management impact intensity would be the same as the Mine Site. Change in land management impact would be high intensity (change from undisturbed and partially disturbed lands to an industrial use, and beneficial from the vantage point of private land owners such as Calista Corporation, TKC, and the Dutch Harbor and Bethel ports, during construction and operations) to low (closure), long-term (construction and operations) to permanent (closure) in duration, regional in extent, and common in context. **Summary impacts would be major (beneficial) except low (adverse) for low level uses of state lands.**	Same as Alternative 2.	Same as Alternative 2.	Impacts would be reduced from barging a shorter distance, but increased from a longer access road. Impacts would include low intensity indirect effects to land management if conveyance of selected lands along the proposed road to BTC is accelerated. **Summary impacts would be moderate to major.**	Same as Alternative 2.	Same as Alternative 2.
Pipeline	Change in land ownership impact intensity would be no effect (direct impacts) to low (indirect impacts); no effect (direct impacts) or temporary to long-term (indirect impacts) in duration; no effect (direct impacts) to local (direct impacts) in extent; and no effect (direct impacts) to common (indirect impacts) in context. Change in land management would be the same as the Mine Site. Change in land use impact intensity would be high, long-term in duration, regional in extent (affecting resources along the pipeline ROW), and common in context, except where impacts to the Iditarod National Historic Trail (INHT) would be important. **Summary impacts would be moderate.**	Same as Alternative 2.	Same as Alternative 2,	Same as Alternative 2.	Same as Alternative 2.	The ROW would be slightly shorter, but would not change land ownership. The alternative alignment would intersect more state lands crossing or adjacent to the INHT. **Summary impacts would be moderate.**
Section 3.16: Recreation						
Mine Site	Change in recreational access impacts would be low in intensity, long-term or permanent (changes in 17(b) easements) in duration, local in extent, and common in context, except important (17(b) easement changes. Change in recreation settings and activities would be low (closure) to high (construction and operations), long-term in duration, local in extent, and common in context, except important in (17(b) easement changes. Recreation use levels are low, and would remain low. Indirect impacts could include perceived contamination of the area. **Summary impacts would be negligible.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Transportation Facilities	Change in recreational access impacts would be low in intensity (closure) to medium (construction and operations), long-term or permanent (changes in 17(b) easements) or temporary (some sections of trail may be closed during construction) in duration, regional in extent, and common in context, except important in (17(b) easement changes. Change in recreation settings and activities would be low, long-term in duration, regional in extent, and common in context. Recreation use levels are low, and would remain low. **Summary impacts would be negligible.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Pipeline	Change in recreational access impacts would be medium, long-term (brush clearing during operations) or permanent (upgrades to three airstrips) in duration, regional in extent, and common in context, except that changes in INHT would be important. Change in recreation settings and activities would be none (closure) or low (operations) or medium (construction), temporary in duration, regional in extent, and common in context, except that changes in INHT would be important. Recreation use levels are low in summer, and moderate in winter. Indirect impacts could increase use, particularly in winter. **Summary impacts would be moderate.**	Same as Alternative 2.	Impacts to recreation may increase due to infrastructure left in place for a diesel spill response. **Summary impacts would be moderate.**	Same as Alternative 2.	Same as Alternative 2.	Activities and infrastructure would affect a medium number of INHT recreationists, but over a greater area with the majority using the trail during the winter season. **Summary impacts would be moderate.**

Table ES - 13: Summary of Impacts

Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Section 3.17: Visual						
Mine Site	Impacts intensity would be high from strong visual contrast of mining equipment, ACMA and Lewis pits, and infrastructure; permanent in duration, as sources of visual contrast would persist following closure of the mine site; local in extent, and common in context with no sensitive viewers. **Summary impacts would be moderate.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Transportation Facilities	Impacts intensity would be low, duration long-term (direct impacts from increased barge and port traffic), regional in extent (though affecting discrete areas along the Kuskokwim River), and important in context. **Summary impacts would be moderate.**	Intensity of impacts resulting from barge traffic would be less as the number of trips would be reduced by one-third. **Summary impacts would be moderate.**	Intensity of impacts resulting from barge traffic would be less as the number of trips would be reduced by one-half. **Summary impacts would be moderate.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Pipeline	Impacts intensity would be moderate (low to high intensity impacts due to vegetation clearing: low intensity where the ROW crosses areas characterized by low stature or variable vegetation structure; moderate to high intensity where the ROW crosses areas characterized by open or closed forests). Visual contrast of the ROW would be strongest in these areas when viewed from elevated or aerial vantage points. Extent would be local, and context would be common except important for the INHT. **Summary impacts would be moderate.**	Same as Alternative 2.	Additional direct impacts could result from construction (expansion) of the existing dock at Tyonek and operation of the expanded port facility. **Summary impacts would be moderate.**	Same as Alternative 2.	Same as Alternative 2.	The pipeline would cross, be collocated, or be located in close proximity to the INHT for a greater percentage of the corridor. **Summary impacts would be moderate.**
Section 3.18: Socioeconomics						
Mine Site	Impacts intensity would be medium to high intensity (increased levels of employment and expenditures in excess of historic limits and trends; employment effects would be particularly high within the Yukon-Kuskokwim (Y-K) region). Impact intensity of project payments to state and local governments and ANCSA corporations would be medium to high and beneficial, while the impacts intensity on public infrastructure would be low. Duration would be temporary (construction) or long-term (operation and closure) in duration. Extent would be variable but primarily regional (affecting communities throughout the Project Area). Context for direct impacts would be important given Donlin Gold's commitment to hire qualified Y-K region residents, thus affecting primarily minority and low-income populations. **Summary impacts would be moderate (beneficial) to Alaska and major (beneficial) in the Y-K region.**	Decrease in jobs and fuel cost savings would result from using LNG instead of diesel; would be small relative to total project employment and expenditures. Revenues to the City of Unalaska from its property tax would not increase because an increase in tank storage capacity at the Port of Dutch Harbor would probably not be required. **Summary impacts would be the same as Alternative 2.**	A larger workforce and increased expenditures required to construct a diesel pipeline and power mining operations with diesel would more than offset any decreases in employment and expenditures due to reduced diesel shipping, barging, trucking, and storage requirements. Construction of a new or expanded dock facility and fuel storage in Cook Inlet would enhance the beneficial effects in the Kenai Peninsula Borough. **Summary impacts would be the same as Alternative 2.**	A larger workforce required to construct a longer road and truck freight and diesel would more than offset any decreases in employment due to reduced barge crews. Construction of a longer road would increase expenditures. **Summary impacts would be the same as Alternative 2.**	Same as Alternative 2.	As a result of the larger workforce and higher expenditures required to construct a pipeline with additional HDD, there would be an enhancement of beneficial direct and indirect employment, income, and sales impacts during project construction. **Summary impacts would be the same as Alternative 2.**
Transportation Facilities	Same as for Mine Site.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Pipeline	Same as for Mine Site.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.

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Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Section 3.19: Environmental Justice						
All Components	Changes in socioeconomic indicators, subsistence, and human health were analyzed to evaluate the potential for disproportionate adverse impacts to low-income and minority communities that may raise environmental justice concerns. The proposed project would have major beneficial socioeconomic impacts to the Y-K region. Most communities in the Y-K region are considered to have low-income and/or minority populations. There would be minor to moderate adverse impacts to subsistence, with the moderate adverse impacts occurring for subsistence fishing in the narrow reaches of the Kuskokwim River (potentially impacting low-income and minority Kuskokwim River communities) and subsistence competition near the Farewell Airstrip area (potentially impacting McGrath, Nikolai, and other low-income and minority communities harvesting subsistence resources in the vicinity). Income which may be used to purchase tools and transportation necessary for subsistence would bring moderate beneficial impacts to the low-income and minority communities of the Y-K region. There could be medium adverse human health impacts to the low-income and minority populations in the Y-K region, with potential increases in rates of accidents, injuries, and non-communicable and chronic diseases. However, there would be medium beneficial human health impacts to the low-income and minority populations of the Y-K region with increased affordability and access to healthcare and improved food security with increased income to facilitate subsistence harvests. Overall, impacts to low-income and minority communities would be both beneficial and adverse and range from low to high intensity. The extent of impacts would be regional (occurring in the Y-K region) and long-term (lasting throughout the project). The context of impacts would be considered unique (affecting minority and low-income populations). Beneficial and adverse effects to low-income and minority populations would be moderate. While socioeconomic impacts and some health impacts would be beneficial and predominantly affect minority and low income communities, **adverse impacts would be disproportionate to low-income and minority communities.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Section 3.20: Cultural Resources						
Mine Site	Medium intensity direct impact to one resource recommended as eligible for the National Register of Historic Places. Duration would be permanent in extent (resource removed from original locations if site cannot be avoided), local in extent (affecting a single resource), important in context (to the subregion). **Summary impacts would be moderate.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Transportation Facilities	A site was located in the vicinity but is not anticipated to be affected. **Summary impacts would be no effect.**	Same as Alternative 2.	Same as Alternative 2.	Medium intensity direct impact to one resource recommended as eligible for the National Register of Historic Places. Duration would be permanent in extent (resource removed from original locations if site cannot be avoided), local in extent (affecting a single resource), important in context (to the subregion). **Summary impacts would be moderate.**	Same as Alternative 2.	Same as Alternative 2.

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Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Pipeline	Medium intensity direct impacts to five resources recommended as eligible for the National Register of Historic Places. Duration would be permanent (resources removed from original locations if sites cannot be avoided), extent would be local (affecting a single resources), context would be important in context (to the subregion). **Summary impacts would be moderate.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Section 3.21: Subsistence						
Mine Site	At the mine site, negligible intensity impacts for all communities except low intensity effects on resources used by Crooked Creek residents subsistence practices; low impact after closure. Low to moderate impacts from barging activity. Long-term duration during mine life; local extent except perceived regional effect on waterfowl, competition effects, and socio-cultural impacts. Competition impacts would affect scarce resources that are important in context. Socio-cultural impacts would affect subsistence use practices of rural communities that are unique in context (protected by federal law and rare in the U.S.). **The summary impacts would be minor to moderate, except for moderate beneficial employment and income effects**.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Transportation Facilities	Intensity would be generally low, except for medium effects from barging in narrow, shallow segments, and medium intensity impacts in displacement of access for fish camps near Angyaruaq (Jungjuk) Port. Effects would be long-term in duration, and regional in extent, extending along the river transportation corridor. Resources affected would be important in context in regard to Chinook salmon, fish camps near Angyaruaq, and in-region competition. Context would be unique in the case of socio-cultural impacts to subsistence communities. Summary impact would be minor, except moderate for subsistence fishing in narrow reaches of the Kuskokwim River. **Summary impacts would be minor, except moderate for subsistence fishing in narrow reaches of the Kuskokwim River.**	Barge frequency would be reduced by 32% due to reduction in diesel fuel barging, reducing impacts to fishing in narrow reaches of the river to low intensity. **Summary impacts would be minor.**	Barge frequency would be reduced by 47.5% with elimination of diesel fuel barging, reducing impacts to fishing in narrow reaches of the river to low intensity. Expanded dock near Tyonek receiving diesel tankers would be low intensity impacts to marine mammals including Cook Inlet beluga whales. Context would be important (Chinook salmon on the Kuskokwim River), or unique (Cook Inlet beluga whales). **Summary impacts would be minor.**	Barging distance would be reduced by 39%, avoiding the more narrow reaches of the river above Birch Tree Crossing. A longer mine access road (46 miles or 250% longer) would increase displacement of habitat and casual, summertime, subsistence uses. Summary effect would be minor, including reduced barging distance and increased impacts from the longer mine access road. **Summary impacts would be minor.**	Same as Alternative 2.	Same as Alternative 2.
Pipeline	During construction, impact intensity on subsistence hunting would be low, and very low for subsistence fishing. During operations, impact intensity of the buried pipeline would diminish to very low. Increased activity at the Farewell Airstrip would increase competition to medium intensity impacts. Socio-cultural impacts from employment would be the same as for the Mine Site. Duration would be long-term, and extent would be localized to segments of the pipeline. Harvest patterns affected would be generally common in context, except that increased competition in the Farewell Airstrip area would be important in context, based on the incremental increase to competition that already affects harvests by McGrath, Nikolai and Telida. **Summary impacts would be minor, except moderate due to increased competition near Farewell Airstrip area.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.

Table ES - 13: Summary of Impacts

Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Section 3.22: Human Health						
All Components	Impacts to human health would be both beneficial and adverse (positive and negative). Benefits to human health would include increased affordability and access to routine and emergency healthcare for acute and chronic conditions, improved food security and increased access to subsistence resources associated with economic benefits generated by the project. Adverse health impacts would be related to potential accidents and injuries, exposure to hazardous constituents, and infectious diseases. Impacts[1] would generally be considered medium in magnitude or intensity, except for accidents and injuries and non-communicable and chronic diseases, where the intensity of the impact could be high. The duration of the impacts would generally be very high, except for infectious diseases and access to routine healthcare services, where the duration of the impact would be high (changes in health indicators would not extend beyond six years and would likely return to baseline levels). The majority of impacts to human health would be medium to high in geographic extent. **Summary impacts would be moderate.**	Health consequences would include reduced rates of accidents and injuries related to water transport, reduced exposures to hazardous constituents in air, water and aquatic biota, and greater access to and quantity of subsistence resources. **Summary impacts would be moderate.**	Health consequences very similar to Alternative 3A. **Summary impacts would be moderate.**	There would be a reduction in the potential for vessel accidents and injuries, an increase in potential surface transport accidents and injuries, a reduction in potential subsistence fisheries impacts, and a potential increase in the displacement of wildlife used by subsistence hunters. **Summary impacts would be moderate.**	Same as Alternative 2.	Same as Alternative 2.
Section 3.23: Transportation						
Mine Site	Nine miles of primitive trails would be affected. Intensity would be low overall as only a few intermittent users would be affected by the removal of trails at the mine site. Duration of effects would be permanent since the trails would not be replaced after mine closure. Effects would be local in extent and limited to the mine site. Trails affected are considered common in context. **Summary impacts would be negligible.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Transportation Facilities	The predominant impact would be from an increase in barge traffic between the Bethel and Angyaruaq (Jungjuk) ports, and an increase in barge receipts at the Port of Bethel. Duration of these medium intensity effects would be long-term and extend throughout the life of the mine. Effects would be regional in extent as communities along the Kuskokwim River from Bethel to the Angyaruaq (Jungjuk) Port would be affected. The context would be important as effects would occur in areas not served by roads that rely extensively on water and air transportation resources. **Summary impacts would be moderate.**	Same as Alternative 2 (reduction in barge trip number).	Intensity would be low due to smaller increase in barge traffic compared to Alternative 2. **Summary impacts would be minor**.	For barge transportation, intensity would be low due to reduced disturbance and displacement of other uses. **Summary impacts would be minor**.	Same as Alternative 2.	Same as Alternative 2.
Pipeline	Intensity would be low overall due to the limited increase in trips and the remote location of the ROW. Duration of effects would be long-term and extend through the life of the pipeline, except for beneficial permanent improvements to existing airstrips. Effects would be regional in extent since effects would occur throughout the proposed project area. The context would be considered important as the communities affected rely on water and air transportation resources and are not served by roads. **Summary impacts would be minor.**	Same as Alternative 2.	Impacts to water transportation in Cook Inlet would be low intensity since the new marine transport would not change or exceed capacity. **Summary impacts would be minor.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Section 3.24: Spill Risk						
All Components	Spill risk is organized by 9 scenarios in Section 3.24, and applied to specific resources. Not every scenario applies to every resource. Please see individual resources for specifics on spill risk (where applicable).	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.

[1] ADHSS (2011, 2015) methodology was used to assess impacts for human health. Impact terminology and ratings differ from other sections in the EIS.

Table ES - 13: Summary of Impacts

Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Section 3.25: Pipeline Reliability						
Pipeline	Risk to the public is evaluated in Section 3.25 rather than impact effects for the pipeline component. With natural gas pipeline construction, there would be a slight increase in risk to the nearby public. Pipeline location is remote, away from high consequence areas (HCAs), further minimizing risk to the public. No risk factors identified that would support public safety risks higher than current industry experience in terms of anticipated number of severity of incidents.	Same as Alternative 2.	Risks from a natural gas pipeline are eliminated in this alternative, as a natural gas pipeline would not be built.	Same as Alternative 2.	Same as Alternative 2.	The alternative pipeline route would not change public safety risk. Same as Alternative 2.
Section 3.26: Climate Change						
Mine Site	Direct GHG emissions would be generated by a dual-fueled (natural gas and diesel) multi-engine power plant, as well as from mobile machinery and the mining equipment necessary for extraction and processing gold throughout the life of the project. Therefore, impacts would be long-term in duration. All activities and impacts would occur at the mine site; the geographic extent would be local for direct emissions of GHGs. The intensity of direct GHG emissions would be considered medium because impacts would be greater than 1 percent of annual GHG emissions for the State of Alaska, but less than 10 percent of annual GHG emissions for the State of Alaska. Climate change effects on water flow are expected to be of low intensity during the mine life and of low to medium intensity during post-closure; climate effects may or may not be discernable beyond extremes predicted by the historical record, hydrologic designs meet or exceed state guidelines and would be adequate to accommodate climate change effects, and water management and treatment strategies are flexible enough to accommodate potential long-term precipitation trends. Sufficient barge days are predicted under a low-water climate change scenario to meet shipping needs without increased risk of barge stranding. In terms of permafrost, project changes in soil would have a comparably greater effect on permafrost thaw than climate change, as removal or disturbance of soils in most areas of the mine site are expected to accelerate thaw much faster than climate change would on undisturbed soils. Wildlife, TES, fisheries, vegetation, wetlands, and subsistence resource impacts are difficult to quantify with the uncertain nature of climate predictions, but would be related to predicted changes in precipitation and temperature affecting vegetation composition and structure that would in turn impact habitat. **Summary impacts would be minor to moderate.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
Transportation Facilities	GHG emissions from fossil fuel combustion would occur from construction equipment, and aircraft, land vehicles and vessels associated with transporting supplies and construction materials to the mine site. GHG emissions associated with operations would result from the combustion of fossil fuels in aircraft, ocean barges, tugs associated with river barges, and tanker trucks delivering diesel. Direct GHG emissions impact would be low (less than 1 percent of Alaska annual GHG emissions). GHG emissions generated by the equipment necessary to conduct closure, reclamation, and post-reclamation activities would last up to 50 years, so impacts would be long-term in duration. Barging could be impacted by changes in precipitation affecting water level. Other resource impacts would similar to those at the mine site. **Summary impacts would be minor.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.

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Project Component	Alternative 2 - Donlin Gold's Proposed Action	Alternative 3A - LNG-Powered Haul Trucks	Alternative 3B - Diesel Pipeline	Alternative 4 - BTC Port	Alternative 5A - Dry Stack Tailings	Alternative 6A - Dalzell Gorge Route
Pipeline	The magnitude of GHG emissions during construction, operations, and closure of all components of this project would be considered low to medium, representing at most 0.024 percent of U.S. total GHG emissions. Precipitation changes could alter stream flow at crossings and scour. Increased precipitation and breakup discharge could cause an increase in the occurrence of glaciation or aufeis effects at co-located ROW and Iditarod National Historic Trail (INHT) segments between MP 84 and MP 97. Other resource impacts would similar to those at the mine site. **Summary impacts would be minor.**	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.

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